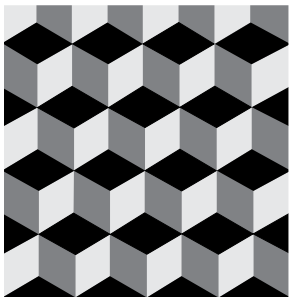

PRIMENJENA PSIHOLOGIJA

FILOZOFSKI FAKULTET · NOVI SAD ·

XIV/1(2021)

UDC 159.9

ISSN 1821-0147

eISSN 2334-7287

PPAA

UNIVERZITET U NOVOM SADU

IZDAVAČ: FILOZOFSKI FAKULTET,
ODSEK ZA PSIHOLOGIJU

Za izdavača:
Prof. dr Ivana Živančević Sekruš,
dekan

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Prelom i štampa: Sajnos doo, Novi Sad

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Web adresa: http://primenjena.psihologija.ff.uns.ac.rs/index.php/pp/index
e-mail: primenja.psihologija@ff.uns.ac.rs

CIP – katalogizacija u publikaciji
Biblioteka Matice srpske, Novi Sad

ISSN 1821-0147
eISSN 2334-7287
COBISS.SR-ID 236071431

PRIMENJENA PSIHOLOGIJA

No1, 2021

Sadržaj

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Editorial

Snežana Smederevac

Incoming Editor-in-Chief, Primenjena psihologija
Department of Psychology, Faculty of Philosophy, University of Novi Sad

"What transforms this world is — knowledge. Do you see what I mean? Nothing else can change anything in this world. Knowledge alone is capable of transforming the world, while at the same time leaving it exactly as it is. When you look at the world with knowledge, you realize that things are unchangeable and at the same time are constantly being transformed."

—Yukio Mishima (1956), *The Temple of the Golden Pavilion*

Primenjena psihologija is a relatively new journal, launched it in 2008 under the leadership of the founding Editor-in-Chief, Jasmina Kodžopeljić. The aims and scope of *Primenjena psihologija* is to publish top-quality empirical papers in various areas of psychology. Previous editorial boards have significantly contributed to the quality of the journal, which is indexed in the Emerging Sources Citations Index (ESCI; Web of science), Scopus and EBSCO databases. I have the honor of being chosen as the next Editor-in-Chief of *Primenjena psihologija* and am really excited to have been given the wonderful opportunity to influence the further development of the Journal.

My biggest challenge in the coming years will be to maintain a high standard of papers published in *Primenjena psihologija* while responding to the compelling challenges of the wider scientific community. Although trust in science has always been an imperative of the academic community, the lessons we have learned point to the importance of taking responsibility for the transparency of all aspects of scientific research (Nosek & Bar-Anan, 2012). Following important changes in the approach to science and scientific research, which are primarily driven by the open science movement, *Primenjena psihologija* extends goals and scope to increasingly relevant replication studies, meta-analyzes and preregistered research. Replication of previous research has a crucial contribution to the validation of scientific achievements. Replication studies conducted by the Open Science Collaboration (2012; 2015) found that of 100 experiments in cognitive and social psychology in the year 2008, only 36% were successfully replicated, indicating the extreme importance of replicated results for the further development of psychology. Shifting the focus of research to verifying previous studies through identical research designs can make an important contribution to psychological science. Therefore, I hope that *Primenjena psihologija* will become the right venue for replication studies.

Next, preregistration of research improves the credibility of findings, distinguishing analyzes and outcomes arising from predictions from those arising from postdictions (Nosek et al., 2018). *Primenjena psihologija* encourages authors to preregister their research, to define hypotheses before data collection, and to avoid a posteriori study design. Adequately preregistered research will be accepted for peer review, regardless of the obtained results.

This expansion of the aim and scope of the journal is accompanied by transparent editorial policies and procedures, including the Open science policy, Editorial Board policy, Peer-review policy and Plagiarism policy. Instructions for authors contain some new clauses, such as inclusive language, research data statement, and possibility to submit supplementary material.

I take this opportunity to emphasize the importance of conscientious peer review and thank all reviewers of *Primenjena psihologija*. Reviewing submitted manuscripts is a time-consuming job and *Primenjena psihologija* will continue to acknowledge the time and effort of all reviewers.

The Team

Primenjena psihologija has a new team of section editors, dedicated to maintaining high standards of published papers through a peer review process and the promotion of scientific results:

International Advisory Bord is the peak body responsible for advising members of the Editorial Board on the planning and implementation of the Journal's policies and dissemination strategies:

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Further support will be provided by the technical secretary, research assistant and PhD student Selka Sadiković, *Department of Psychology, Faculty of Philosophy, University of Novi Sad.*

In closing, I express my sincere gratitude to the outgoing Editor-in-Chief Jasmina Pekić, the entire team of former section editors and the large number of reviewers who contributed to the development of the Journal.

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Nosek, B. A., Ebersole, C. R., DeHaven, A. C., & Mellor, D. T. (2018). The preregistration revolution. *Proceedings of the National Academy of Sciences*, *115*, 2600–2606. https://doi.org/10.1073/pnas.1708274114

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UDK: 159.9.072.2
Originalni naučni rad
doi: https://doi.org/10.19090/pp.2021.1.9-32

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Primljeno: 20.08.2020.
Primljena korekcija: 20.12.2020.
Prihvaćeno za štampu: 12.03.2021.

ULTRALAB – SLOBODAN SOFTVER ZA IZVOĐENJE PSIHOLOŠKIH EKSPERIMENATA

Cilj ovog rada je da predstavi novi alat za pripremu i izvođenje psiholoških eksperimenata, koji smo kreirali kako bi se obogatila i olakšala praktična nastava kognitivne psihologije, ali i ostalih psiholoških disciplina koje koriste eksperimentalnu metodologiju. Osnovna namena tog alata je pomoć univerzitetskoj nastavi, ali se može koristiti i za prikupljanje podataka. Prikazan je program UltraLab koji je osmišljen sa idejom da prati savremene trendove i bude besplatan, jednostavan za pripremu i zadavanje eksperimenata, a da se može koristiti za širok spektar eksperimentalnih paradigmi. Priložen je i link preko kojeg se može preuzeti prikazani alat. U radu je dat opis osnovnih tehničkih karakteristika, detaljno uputstvo za pripremu eksperimentalnih fajlova, kao i detaljno tumačenje ispisa sa podacima. Na kraju, istaknute su prednosti koje primena ovakvog alata donosi studentima koji usvajaju gradivo iz eksperimentalne psihologije.

Ključne reči: eksperiment, softver, nastava, Java, psihologija

Uvod

Izvođenje praktične nastave smatra se važnim činiocem sticanja znanja i veština, naročito na višim nivoima obrazovanja (Katajavuori et al., 2006). Međutim, ono istovremeno predstavlja i svojevrstan izazov. Pored toga što je važno osmisliti demonstracije koje će na efikasan i jezgrovit način učenicima/studentima ilustrovati odabrani fenomen, neophodno je obezbediti i tehničke uslove za njihovo sprovođenje. Ovo je naročito teško postići za one fenomene koji su zabeleženi u laboratoriji, pod strogo definisanim uslovima izlaganja i uz primenu odgovarajuće tehnike. Mnogi kognitivni fenomeni zabeleženi su upravo na ovakav način, što znači da njihova demonstracija u edukativne svrhe postavlja dodatne zahteve pred nastavnika. Usled toga praktična nastava (vežbe) iz oblasti kognitivne psihologije najčešće se izvodi uz fokusiranje na neke od opštih tema, dok se konkretni empirijski fenomeni često zanemaruju. Posledično, studenti ostaju uskraćeni za važno iskustvo upoznavanja sa fenomenima o kojima uče na kursu, a učenici srednjih škola skoro da nemaju nikakvog iskustva sa eksperimentalnim istraživanjima u psihologiji.

Imajući u vidu značaj praktične nastave, neki od najpoznatijih istraživača u oblasti kognitivne psihologije i autori nekih od najpoznatijih udžbenika kognitivne psihologije ponudili su unapred pripremljene klasične eksperimente iz svoje oblasti. Takav je, na primer, Sniffy – virtual rat (Alloway et al., 2005; Graham et al., 2012), kao i CogLab (Francis & Neath, 2007; Vanhorn et al., 2011). Premda je veoma jednostavan za upotrebu, CogLab se dobija uz kupljen udžbenik kognitivne psihologije i može se koristiti isključivo kao propratno nastavno sredstvo u nastavi koja se zvanično oslanja na dati udžbenik. Problem prevođenja udžbenika (kao i jezičkog materijala koji se prikazuje u nekim od eksperimenata) nije nepremostiv, ali ostaju neka dodatna potencijalna ograničenja u upotrebi CogLab-a. Jedno od njih jeste činjenica da nastavnik nema nikakvu mogućnost da u bazu postojećih eksperimenata doda novi eksperiment koji bi želeo da demonstrira studentima ili učenicima.

Jedno od mogućih rešenja za potrebe praktične nastave može da bude kreiranje eksperimenata uz upotrebu komercijalnog softvera koji se uobičajeno koristi u eksperimentalnim istraživanjima. Danas na tržištu postoji veliki izbor ovakvih alata, a neki od najrasprostranjenijih su E-Prime (Psychology Software Tools, Pittsburgh, PA), Presentation (Neurobehavioral Systems, Inc., Berkeley, CA), SuperLab (Cedrus Corporation, San Pedro, CA), Inquisite (Millisecond Software, Seattle, WA) itd. Kvalitet ovih programa je provereno visok, jer se decenijama koriste i usavršavaju. Međutim, veliku prepreku za njihovu široku upotrebu u nastavnim aktivnostima predstavlja činjenica da je za ovakav softver potrebno imati dovoljan broj plaćenih licenci, kako bi svaki student ispred sebe imao računar sa operativnim eksperimentalnim softverom. Mnogi univerziteti, odnosno škole ne mogu da priušte kupovinu potrebnog broja licenci.

Rešenje za problem skupih licenci pojavilo se tokom prethodnih decenija u vidu slobodnog (engl. *free*) i otvorenog (engl. *open source*) softvera za pripremu

i sprovođenje eksperimentalnih istraživanja. Najpoznatiji predstavnici ove kategorije alata su DMDX (Forster & Forster, 2003), PsychoPy (Peirce, 2007; 2009; Peirce & MacAskill, 2018; Peirce et al., 2019) i OpenSesame (Mathôt et al., 2012). Pojava besplatnih alata u velikoj meri je olakšala izvođenje eksperimentalnih istraživanja i dovela do velikog širenja primene ove paradigme (za pregled slobodnog i otvorenog softvera u eksperimentalnoj psihologiji *videti* Filipović Đurđević, 2020). Dodatno, u novije vreme, sve prisutniji je i trend prikupljanja podataka preko Interneta. Samim tim, izuzetnom brzinom razvijaju se i novi softverski alati koji čine mogućim i olakšavaju ovaj proces. To važi za komercijalne alate, (kao što je, na primer Qualtrics (Qualtrics, Provo, UT), ali i za sve veći broj slobodnih i otvorenih alata pomoću kojih se podaci mogu prikupljati van laboratorije. Najpoznatiji među njima su PsychoPy[3] (Peirce et al., 2019), OSWeb (Mathôt et al., 2012), jsPsych (de Leeuw, 2015), Labjs (Henninger et al., 2019) itd. Premda su u početku imali neka ograničenja u pogledu paradigmi na koje se mogu primeniti, tehničke mogućnosti ovih alata unapređuju se izuzetno velikom brzinom. Pored nabrojanih alata koji su prvenstveno razvijani za potrebe prikupljanja podataka u istraživačke svrhe, od nedavno postoji i plaforma posvećena i kreiranju eksperimenata u edukativne svrhe. To je PsyToolkit (Stoet, 2017), koji istraživačima, nastavnicima i studentima nudi bazu sačinjenu od jednog broja poznatih eksperimentalnih paradigmi. Pored toga, nudi i mogućnost pripreme sopstvenih eksperimenata, koje je zasnovano na pojednostavljenim principima i zahteva poznavanje malog broja pravila na kojima se zasniva pisanje koda.

Imajući u vidu potrebe (kao i prednosti) praktične nastave, odlučili smo da nastavnicima ponudimo softver koji će biti dovoljno fleksibilan da omogući pripremu i izvođenje različitih tipova eksperimenata, a koji će biti dodatno pojednostavljen u odnosu na postojeća softverska rešenja – čija primena će se oslanjati na bazično poznavanje rada u programima kakav je MS Excel, LibreOffice Calculator i sl.

Cilj rada

U ovom radu biće prikazan autorski softverski alat UltraLab. Ovaj alat omogućava da empirijski fenomeni koji se obrađuju u okviru nekog kursa budu izloženi na način koji studentima omogućava iskustvo iz prve ruke. Prvobitno je kreiran za potrebe praktične nastave iz oblasti kognitivne psihologije, ali podjednako uspešno može biti primenjen u bilo kojoj grani nauke u kojoj se humanim ispitanicima stimulacija emituje putem ekrana ili zvučnika, a odgovori beleže pritiskom na taster ili pomoću papira i olovke. Na sličan način, premda je izvorno osmišljen za nastavu koja se odvija u učionici, ovaj alat može uspešno biti primenjen i u nastavi koja se odvija na daljinu, kao što je bio slučaj tokom pandemije virusa SARS-CoV-2 tokom 2020. godine.

Važno je naglasiti i to da cilj nije da se ponudi softver koji će se takmičiti sa široko rasprostranjenim sličnim alatima koji se koriste u eksperimentalno-psihološkim istraživanjima. Cilj je da se napravi alat koji će prvenstveno pripremu eksperimenata u svrhu praktične nastave učiniti još jednostavnijom, kao i da se ponudi baza klasičnih psiholoških eksperimenata na srpskom jeziku.

Jedan od problema u primeni postojećih aplikacija za izvođenje eksperimenata predstavlja to što zahtevaju prethodnu instalaciju. UltraLab je zamišljen kao aplikacija koja može da se aktivira bez prethodnog instaliranja, tako što je dovoljno da se grupa fajlova kopira na računar na kojem se pokreće eksperiment. To je omogućeno time što je izgrađen na Java platformi, koja je standardni deo softverske opreme većine računara. Dodatno, time se izbegava konfigurisanje računara u smislu autorizacije pristupa ili pokretanja nebezbednog softvera, što je često nametnuto od strane administratora u cilju povećanja bezbednosti.

Podaci koji upravljaju izvršenjem eksperimenta kreiraju se u MS Excel tabeli (ili tabeli nekog sličnog programa). Ključne karakteristike unose se uvek u 11 polja sa unapred definisanom namenom i skupom mogućih vrednosti, pri čemu jedan red tabele odgovara jednom merenju, a stimulusi koji se nižu u okviru jednog merenja ređaju se sukcesivno, jedan do drugog, u istom redu. Sve ovo čini proces pripreme izuzetno jednostavnim. Pored toga, za neke od kognitivnih fenomena postoje već spremni šabloni koje smo pripremili i koji su besplatno dostupni.

Uprkos svojoj jednostavnosti, UltraLab omogućava kreiranje i izvođenje velikog broja različitih eksperimentalnih paradigmi, kao što su zadatak leksičke odluke, zadatak prihvatljivosti rečenice, zadatak čitanja sopstvenim tempom, zadaci vizuelne i memorijske pretrage, zadaci učenja, dvostruki zadaci, različiti zadaci koji testiraju pažnju itd.

Prikaz softvera

U narednom segmentu dajemo kratak opis alata UltraLab tako što najpre ukratko predstavljamo njegove tehničke karakteristike, a potom se detaljnije fokusiramo na opis njegovih performansi i na uputstva za upotrebu.

Tehnička pozadina

UltraLab je razvijen u programskom jeziku Java, a za razvoj je korišćen Java SE Developmpent Kit 8 (https://www.oracle.com/java/technologies/javase-downloads.html) i razvojno okruženje NetBeans (https://netbeans.org). Izvorni kod alata čini 13 klasa, od kojih jedna predstavlja glavni grafički interfejs i automatski je generisana od strane razvojnog okruženja. Za formiranje

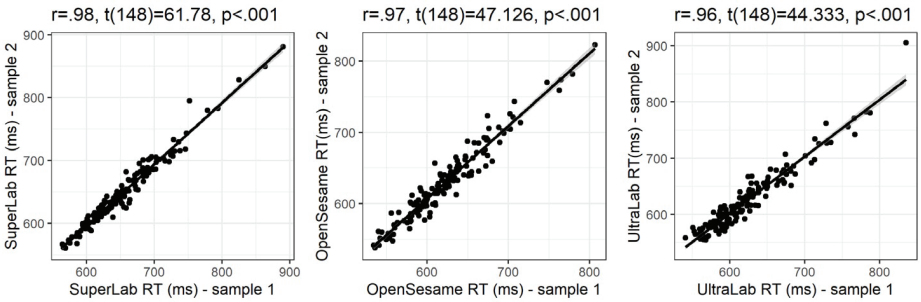
prikaza i interakciju sa korisnikom koriste se paketi AWT i Swing. Zahvaljujući tome, alat može da prikaže vizuelne stimuluse u svim široko podržanim formatima digitalnih slika, kao što su BMP, PNG ili JPG. Za čitanje i reprodukciju zvučnih stimulusa koristi se klasa AudioSystem iz paketa JavaX. Iako postoje savremeniji paketi za vizuelizaciju i interakciju, autori su se odlučili za navedene iz dva razloga. Najpre, autori su se u praksi često susretali sa eksperimentalnim računarima relativno zastarelog hardvera, na kojima bi noviji paketi pokazali lošije performanse i činili upotrebu alata manje ugodnom. Zatim, dužina vremenskog perioda u toku kojeg su upotrebljeni paketi bili u širokoj upotrebi pruža svojeversnu garanciju da su iz njih uklonjene najčešće greške i problemi kompatibilnosti na različitim platformama. UltraLab će funkcionisati na svakom računaru na kojem postoji instalirana Java, bez obzira na operativni sistem. Njegov rad uspešno je testiran u okviru operativnog sistema Windows 98, Windows 7, Windows 10, Linux (Ubuntu 16.04 LTS) i Mac OS (Catalina 10.15.4). Na sličan način, ne postoje specifični zahtevi ni u pogledu konfiguracije hardvera – ukoliko je uspešno instalirana Java, odnosno ukoliko je Java virtuelna mašina operativna, biće operativan i UltraLab. U tome i jeste velika prednost Jave kao platforme: jednom napisan softver će uvek raditi, nezavisno od hardvera. Orijentacije radi, softver je u upotrebi od 2013. godine, kada je funkcionisao na PC konfiguracijama uobičajenim za tu godinu (i starijim). Od tada je intenzivno testiran na različitim računarima, u računarskim učionicama različitog nivoa opremljenosti.

Evaluacija performansi: pouzdanost i validnost merenja

Da bismo testirali pouzdanost i validnost podataka zabeleženih upotrebom UltraLaba, iskoristili smo skup stimulusa koji je pod istim uslovima prikazan upotrebom tri različita softvera trima grupama ispitanika u tri vremenska trenutka (sa razmakom od nekoliko godina). Taj skup stimulusa činilo je 150 polisemičnih imenica srpskog jezika (Filipović Đurđević & Kostić, 2017), a prikazane su u zadatku vizuelne leksičke odluke u kojem je mereno vreme reakcije. Prvi skup podataka (Filipović Đurđević & Kostić, 2009) prikupljen je primenom komercijalnog softvera SuperLab (Cedrus Corporation, San Pedro, CA), drugi skup podataka (Filipović Đurđević & Kostić, 2021) prikupljen je primenom otvorenog softvera OpenSesame (Mathôt et al., 2012), a za prikupljanje trećeg skupa podataka za isti skup stimulusa primenjen je UltraLab (Filipović Đurđević, 2014). Tri grupe ispitanika uzorkovane su iz homogene populacije govornika srpskog jezika. S obzirom na to da je u istraživanju u kojem je primenjen UltraLab učestvovalo 32 ispitanika, iz preostala dva skupa podataka, po slučajnom principu uzorkovano je po 32 ispitanika, kako bi tri uzorka bila ujednačena po veličini.

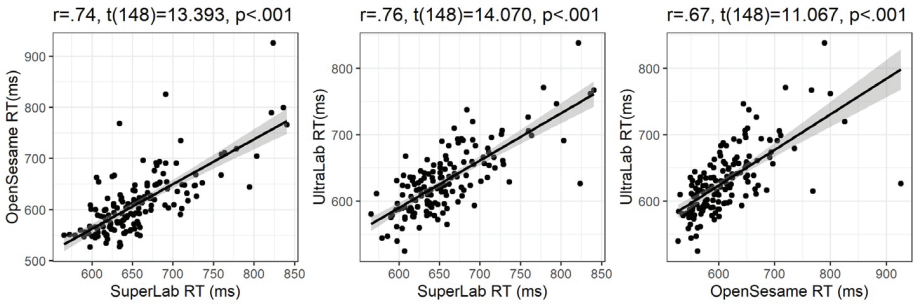
Pouzdanost merenja testirali smo tako što smo uzorak ispitanika kojima su stimulusi prikazani datim softverom podelili na pola, a potom unutar svake

polovine izračunali prosečne vrednosti vremena reakcije za 150 prikazanih reči. Potom smo izveli koeficijente korelacije za dva niza prosečnih vremena reakcije. Najpre smo ovaj postupak primenili na podatke prikupljene softverom SuperLab (Cedrus Corporation, San Pedro, CA) i OpenSesame (Mathôt et al., 2012), kako bismo imali kotvu za poređenje. Oba popularna softvera su pokazala visoku pouzdanost merenja. Kao što Slika 1 pokazuje, u oba slučaja zabeležene su veoma visoke vrednosti Pirsonovog koeficijenta korelacije (r = .98 za SuperLab i r = .97 za OpenSesame). Konačno, ponovili smo postupak i za podatke prikupljene softverom UltraLab i zabeležili skoro identičnu vrednost koeficijenta korelacije (r = .96; Slika 1). Dakle, možemo zaključiti da je merenje softverom UltraLab pouzdano i to u istoj meri u kojoj je to merenje izvedeno preko dve široko rasprostranjene i temeljno testirane softverske aplikacije.



Slika 1. Prikaz povezanosti između vremena reakcije uprosečenih unutar dve (nasumično formirane) polovine uzorka ispitanika kojima je 150 reči prikazano primenom softvera SuperLab (prvi grafikon s leva), OpenSesame (grafikon u sredini) i UltraLaba (poslednji grafikon u nizu).

Validnost merenja testirali smo tako što smo analizirali povezanost prosečnih vremena reakcije za 150 reči srpskog jezika prikuljenih primenom tri odabrane softverske aplikacije. Kako bismo imali kotvu za poređenje, najpre smo izračunali Pirsonov koeficijent korelacije između prosečnih vremena reakcije prikupljenih primenom programa SuperLab (Cedrus Corporation, San Pedro, CA) i OpenSesame (Mathôt et al., 2012). Kao što se može videti na Slici 2, zabeležena je visoka povezanost dva niza podataka (r = .74). Potom smo isti postupak primenili za podatke prikupljene programima SuperLab i UltraLab (r = .76), kao i OpenSesame i UltraLab (r = .67). Kao što se može videti na Slici 2, stepen povezanosti mera prikupljenih softverom UltraLab sa svakom od dve proverene softverske aplikacije je visoko i sasvim uporedivo sa stepenom povezanosti između dva niza podataka prikupljenih tim dvema aplikacijama. Dakle, možemo smatrati da se primenom softvera UltraLab postiže zadovoljavajuća validnost merenja i da je ta validnost uporediva sa onom koja se postiže primenom dve etablirane i testirane softverske aplikacije.



Slika 2. Prikaz povezanosti između vremena reakcije za 150 reči prikazanih različitim ispitanicima primenom tri različita softverska alata: SuperLab (prvi grafikon s leva), OpenSesame (grafikon u sredini) i UltraLab (poslednji grafikon u nizu).

Uputstva za upotrebu

U ovom odeljku dajemo opis gotovog softverskog proizvoda, odnosno njegove upotrebe. Učinićemo to dajući detaljna uputstva koja su značajna za korisnike alata. Počećemo instrukcijama za kreiranje eksperimentalnih fajlova, objasniti pokretanje eksperimenta, a potom opisati ispis, odnosno formu fajla sa prikupljenim podacima. Daćemo i kratke smernice o načinu na koji se dalje mogu analizirati prikupljeni podaci. Na kraju, daćemo i ilustraciju kako konkretno izgleda primena na slučaju jedne široko rasprostranjene eksperimentalne paradigme – zadatka vizuelne leksičke odluke.

Priprema eksperimentalnih fajlova – instrukcija za prikazivanje stimulusa i snimanje reakcije

Da bi eksperiment funkcionisao potrebno je pripremiti slikovne i zvučne fajlove (ukoliko je planirano reprodukovanje takvih fajlova) i jedan tekstualni fajl koji će sadržati instrukcije za prikazivanje stimulusa, registrovanje i čuvanje odgovora. Putanje do fajlova koji se koriste u eksperimentu (poput slika) navode se u pomenutom tekstualnom fajlu. Naš savet je da svi fajlovi koji se koriste u eksperimentu budu smešteni u folder „data“ (tako da naziv oslikava njegovu namenu); taj folder treba da bude smešten u isti folder u kojem se nalazi izvršni fajl UltraLab. Ukoliko u eksperimentu nije predviđeno prikazivanje slika i zvukova, folder „data“ ne mora da postoji ili može biti prazan.

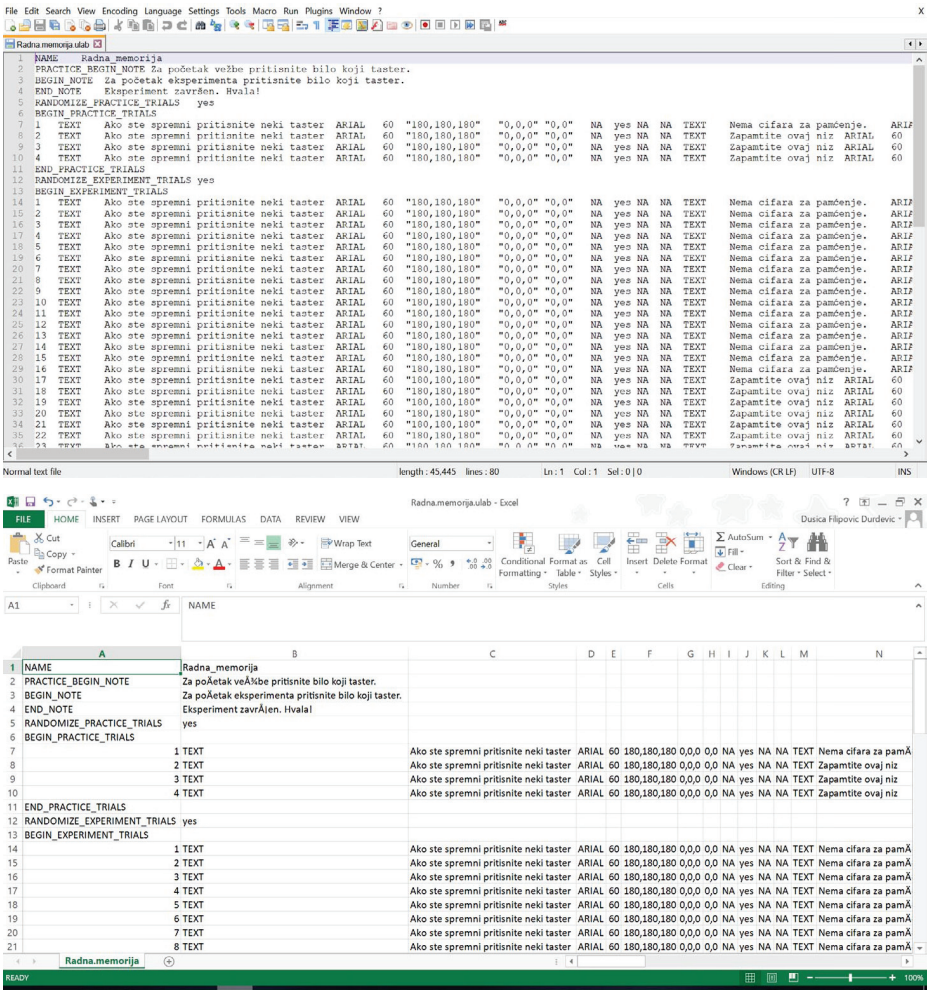
Sve instrukcije za sprovođenje eksperimenta nalaziće se u tekstualnom fajlu sa proizvoljnim imenom i obaveznom ekstenzijom „ulab“ (npr. moj_eksperiment.ulab). Prikaz dela jednog ovakvog fajla dat je na Slici 3. Ovaj fajl može se pripremati u tekstualnom editoru (Slika 3, gore), ili u programu MS Excel

(Slika 3, dole). Instrukcije su organizovane u tri celine: opšta uputstva, vežba i eksperiment.

Prva od tri celine (opšta uputstva) sastoji se od četiri reda i dve kolone. Sadržaj prve kolone ne treba menjati, jer on sadrži ključne reči koje su važne za pravilno tumačenje instrukcija od strane programa. Sadržaj druge kolone može da se menja bez posledica po ispravnost tumačenja. Tako na primer, prvi red sadrži informaciju o nazivu eksperimenta. Ono što eksperimentator unese u polje koje se nalazi u prvom redu i drugoj koloni, biće naziv eksperimenta koji će biti vidljiv studentima kada pokrenu program. Stoga u ovo polje treba uneti neki smislen sadržaj, ali bez razmaka (npr. treba koristiti donju crtu umesto razmaka). Informacije koje se nalaze u narednih nekoliko redova prvog segmenta nije potrebno menjati, premda je to moguće, ukoliko eksperimentator poželi (uz podsećanje da promene treba unositi samo u drugu kolonu, ne i u prvu). U ovim redovima nalaze se: sadržaj poruke koja će biti prikazana pred početak vežbe (drugi red), sadržaj poruke koja će biti prikazan nakon završetka vežbe, a pred početak eksperimenta (treći red), kao i sadržaj poruke koja će biti prikazana po završetku eksperimenta (četvrti red).

Druga od tri celine posvećena je vežbi, a počinje informacijom o tome da li zadatke, odnosno merenja (engl. *trial*) treba izlagati redosledom kojim su navedeni u fajlu, ili ih treba prikazivati slučajnim redosledom koji je različit od redosleda u fajlu (sedmi red). Ukoliko je u drugoj koloni petog reda navedeno „yes“, redosled zadataka će pre prikazivanja biti randomizovan (stimulusi će biti raspoređeni u nasumični, slučajni redosled), odnosno oni neće biti prikazani redosledom kojim su navedeni u fajlu. U suprotnom, zadaci će biti izlagani redosledom kojim su navedeni. Sledeća, šesta linija označava početak vežbe. Nakon ove linije započinje definisanje pojedinačnih zadataka, što će kasnije biti detaljno opisano. Ovaj segment instrukcija organizovan je tako da jedan red označava jedan zadatak, pri čemu svaki red počinje rednim brojem koji će i kasnije služiti kao identifikator datog zadatka (tj. merenja). Tako na primer, u primeru datom na Slici 3, vežba sadrži četiri zadatka. Segment posvećen vežbi završava se linijom koja označava kraj vežbe.

Konačno, sledi treći segment, koji je posvećen glavnom delu eksperimenta, a koji je organizovan na potpuno isti način kao i drugi segment (posvećen vežbi): počinje informacijom o potrebi za izlaganjem stimulusa slučajnim redosledom (tzv. randomizacijom), oznakom početka, linijama koje definišu pojedinačna merenja i oznakom kraja, koja istovremeno predstavlja i poslednju liniju ovog fajla.



Slika 3. Izgled tekstualnog fajla sa instrukcijama za sprovođenje eksperimenta u tekstualnom editoru (gore) i u MS Excel-u (dole). https://github.com/dfdurdevic/UltraLab/blob/main/Radna.memorija.ulab.

Sada ćemo se pozabaviti jedinim delom fajla koji eskperimentator treba da uredi, a to su instrukcije za pojedinačne zadatke (tj. pojedinačna merenja, enlg. *trials*). One se formiraju na identičan način u segmentu posvećenom vežbama i segmentu koji je posvećen eksperimentu. Kao što je pomenuto, jedan zadatak definisan je jednim redom, pri čemu svaki red počinje rednim brojem zadatka. U nastavku reda nižu se sekvence od po 11 polja (ili ćelija u Excel tabeli). Svaka

od tih sekvenci sadrži instrukcije koje su potrebne za prikazivanje jednog stimulusa.

Sekvenca od 11 polja kojom se upravlja prikazivanjem stimulusa predstavlja ključni element ovog programa i osmišljena je tako da svako od 11 polja nosi unapred definisani tip informacije. Te informacije su: tip sadržaja koji treba da se prikaže (tekst, slika ili zvuk), materijal koji treba da se prikaže, font, veličina stimulusa, boja slova, boja pozadine, pozicija stimulusa na ekranu, trajanje stimulusa, potreba za registrovanjem odgovora ispitanika, podatak o tačnom odgovoru i potreba za snimanjem vremena reakcije. Polja su međusobno rastavljena znakom tabulacija (tab). Počevši od drugog polja pa do kraja, mogući sadržaj zavisi od toga da li je u prvom polju definisano da se radi o tekstu, slici ili zvuku (npr. u slučaju teksta sadržaj drugog polja predstavlja sam tekst koji treba da bude prikazan, dok u slučaju slike i zvuka sadržaj drugoj polja predstavlja putanju lokacije fajla u kom se nalazi data slika ili dati zvuk. U slučaju da je putanja relativna, kao početak uzima se folder u kojem je program UltraLab pokrenut. Detaljan pregled mogućih vrednosti svakog od polja dat je u Tabeli 1.

Tabela 1
Struktura informacija koje je potrebno uneti prilikom konstruisanja koda za izvođenje eksperimenta

Polje 1	Tip sadržaja koji treba da se prikaže	Tekst (TEXT)	Slika (IMAGE)	Zvuk (SOUND)
Polje 2	Materijal koji treba da se prikaže	Tekst koji treba da se prikaže (npr. reč, rečenica itd)	Naziv fajla, a ukoliko se slika ne nalazi u folderu data, onda i putanja do fajla (npr. data\slike\moja_slika.bmp)	Naziv fajla, a ukoliko se slika ne nalazi u folderu data, onda i putanja do fajla (npr. data\zvuk\moj_zvuk.wav)
Polje 3	Font	Naziv fonta kojim treba da bude prikazan tekst (npr. Calibri)	Nije primenljivo (NA)	

Polje 4	Veličina stimulusa	Brojem izražena veličina fonta (npr. 60)	Veličina slike: original (izvorna veličina) ili fit (veličina kojom se slika najbolje uklapa u ekran)	Nije primenljivo (NA)
Polje 5	Boja slova	Boja kojom će tekst biti prikazan, izražena u RGB sistemu (npr. 255, 255, 255)	Nije primenljivo (NA)	
Polje 6	Boja pozadine	Pozadinska boja ekrana izražena u RGB sistemu (npr. 255, 255, 255)		
Polje 7	Pozicija stimulusa na ekranu	Koordinate po verikalnoj i horizontalnoj osi (npr. da stimulus bude centriran potrebno je uneti 0,0)		Uvek 0,0
Polje 8	Trajanje stimulusa (ekspozicija)	Brojkom izraženo vreme zadržavanja stimulusa na ekranu, izraženo u milisekundama ili NA (ako trajanje nije primenljivo)		
Polje 9	Da li odgovor ispitanika treba da bude registrovan?	Ukoliko odgovor ispitanika treba da bude registrovan (bez obzira na to da li će biti snimljen, npr. da li odgovor ispitanika može da prekine izlaganje datog stimulusa), potrebno je uneti “yes”. Ukoliko odgovor ispitanika ne treba da bude registrovan, odnosno postoji plan izlaganja na koji odgovor ispitanika ne sme da ima uticaj, potrebno je uneti “no”		
Polje 10	Šta predstavlja tačan odgovor?	Ukoliko je tačan odgovor pritisak na levi taster miša, potrebno je uneti “accept”; ukoliko je tačan odgovor pritisak na desni taster miša, potrebno je uneti “reject”. Ukoliko nije definisan tačan odgovor, potrebno je uneti NA.		
Polje 11	Da li je potrebno snimiti vreme reakcije?	Ukoliko je potrebno snimiti vreme od trenutka izlaganja aktuelnog stimulusa do trenutka pritiska na taster miša, ovde treba uneti “yes”. Ukoliko se ne snima vreme treba uneti “no”. Ukoliko je u polju 9 uneto da odgovor ispitanika ne treba da se registruje, u ovo polje treba uneti NA.		

U Tabeli 2 navedeno je nekoliko primera definisanja stimulusa različitih kategorija. Tako na primer, Tabela 2a daje instrukciju za prikazivanje fiksacionog krstića: u pitanju je tekst, konkretno znak "+" koji treba da bude prikazan u fontu Arial, veličinom 60. Boja teksta će biti srednje siva (180, 180, 180), dok će pozadina biti bela (255, 255, 255). Tekst će biti prikazan tačno na sredini ekrana (0, 0) u trajanju od 1000 ms, nakon čega će nestati sa ekrana. Odgovor ispitanika neće imati nikakav uticaj na trajanje prikazivanja fiksacione tačke, odnosno nije predviđeno da ispitanik daje odgovor na ovaj stimulus. Samim tim, nije definisan ni tačan odgovor, niti je predviđeno snimanje vremena reakcije. Tabela 2b definiše prikazivanje reči "lopta" fontom Arial u veličini 60, srednjesivom bojom (180, 180, 180) na beloj pozadini (255, 255, 255), na sredini ekrana (0,0). Ne postoji ograničenje za vreme prikazivanja stimulusa, već je predviđeno da dalji tok eksperimenta zavisi od odgovora ispitanika, što znači da će ovaj stimulus ostati na ekranu sve dok ispitanik ne odgovori pritiskom na taster miša. Tačan odgovor je pritisak na levi taster miša, a predviđeno je da vreme reakcije bude snimljeno. Ukoliko bi cilj bio da se prikaže fiksacioni krstić u trajanju od 1000 ms, a potom reč na koju ispitanik treba da odgovori pritiskom na taster, Tabele 2a i 2b bi trebalo navesti u istom redu i to tako što bi Tabela 2b bila navedena desno od Tabele 2a, uz obavezan znak tabulacije kao separator između ovih tabela. Dalje, Tabela 2c definiše prikazivanje slike smeštene u fajl pod nazivom lopta.bmp, koja je smeštena u folder slike, koji se nalazi u folderu data, koji je smešten u isti folder u kojem se nalazi i eksperimentalni kod. Slika će biti prikazana u izvornoj veličini, na belom ekranu (255, 255, 255), na sredini ekrana (0, 0). Ostaće na ekranu 150 ms i potom nestati sa ekrana, bez obzira na reakciju ispitanika (nije predviđeno da ispitanik daje odgovor na ovu sliku). Samim tim, nije definisan ni tačan odgovor, niti je planirano snimanje vremena reakcije. Tabela 2d upravlja prikazivanjem iste slike, ali je ona ovoga puta smeštena u folder data, pa nije potrebno navoditi putanju. Slika se ponovo prikazuje u originalnoj veličini, ali je boja pozadine drugačija (50, 100, 150), a drugačija je i pozicija na ekranu (150, 300). Ovoga puta, slika će ostati na ekranu sve dok ispitanik ne pritisne taster miša, pri čemu je tačan odgovor pritisak na levi taster, a vreme reakcije će biti zabeleženo. Konačno, primer opisan u Tabeli 2e predstavlja izlaganje zvučnog stimulusa i to zvuka koji se nalazi u fajlu pod imenom lopta.wav, a koji je smešten u folder zvuk, koji se nalazi u folderu data. S obzirom na to da se radi o zvuku, definisana je samo boja pozadine ekrana koja će biti prikazana za vreme izlaganja zvuka. Na početak prikazivanja sledećeg stimulusa čekaće se 1000 ms, dok odgovor ispitanika nije predviđen (samim tim nije definisan tačan odgovor niti je predviđeno čuvanje podatka o vremenu reakcije).

Tabela 2
Primer koda za različite kategorije stimulusa

a)

TEXT	+	ARIAL	60	180, 180, 180	255, 255, 255	0, 0	1000	no	NA	NA

b)

TEXT	lopta	ARIAL	60	180, 180, 180	255, 255, 255	0, 0	NA	yes	accept	yes

c)

IMAGE	data/slike/ lopta.bmp	NA	original	NA	255, 255, 255	150, 300	150	no	NA	NA

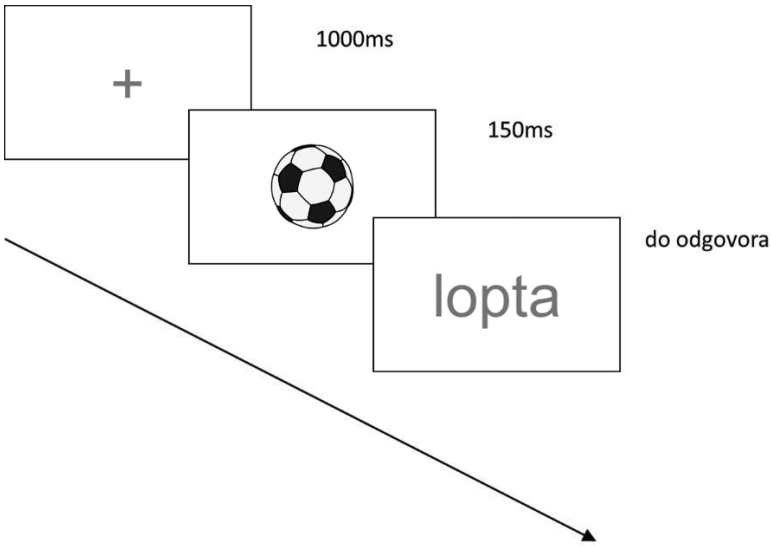
d)

IMAGE	lopta.bmp	NA	original	NA	50, 100, 150	0, 0	NA	yes	accept	yes

e)

SOUND	data/zvuk/lopta.wav	NA	NA	NA	255, 255, 255	0, 0	1000	no	NA	NA

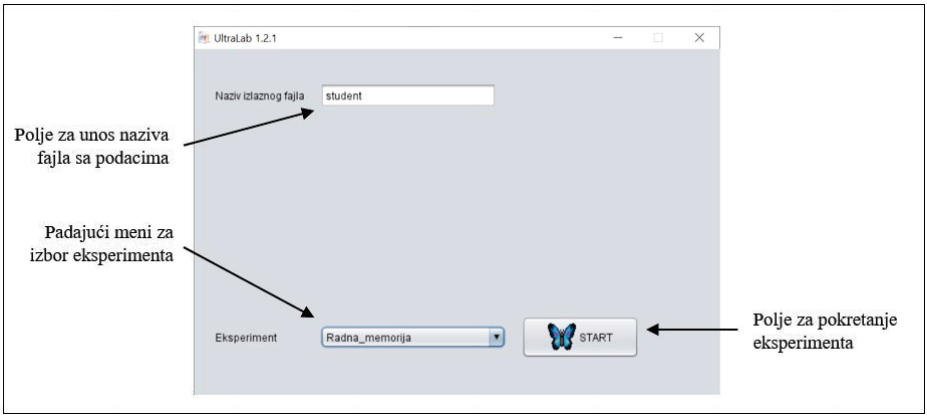
Kao što je već pomenuto, sekvenca smenjivanja stimulusa u okviru jednog merenja jednostavno se postiže nizanjem jedanaestočlanih sekvenci u istom redu, pri čemu redosled prikazivanja prati redosled tih sekvenci s leva na desno. Tako na primer, ukoliko bismo želeli da merimo vreme odgovora u zadatku verifikacije slaganja slike i reči, trebalo bi da s leva na desno, u istom redu nižemo sekvence navedene u Tabeli 2a, potom 2c i na kraju 2b. Slika 4 ilustruje niz ekrana sa belom pozadinom i centriranim stimulusima koji bi bili vidljivi ispitaniku u tom slučaju. Prvi bi sadržao sivu fiksacionu tačku u trajanju od 1000 ms, drugi bi sadržao sliku lopte u trajanju od 150 ms, dok bi se na trećem nalazila reč „lopta“ (napisana sivim slovima u fontu Ariel, veličine 60) koja bi ostala na ekranu sve dok ispitanik ne odgovori. Odgovor ispitanika i vreme koje je prošlo od trenutka prikazivanja reči do trenutka davanja odgovora bili bi sačuvani.



Slika 4. Primer niza stimulusa u okviru jednog zadatka (merenja, trajala) koji bi bio generisan nizanjem jedanaestočlanih sekvenci navedenih u Tabeli 2 i to redosledom: 2a, 2c, 2b.

Pokretanje eksperimenta

Alat UltraLab dostavljen je u vidu izvršnog JAR (Java ARchive) i prateće biblioteke pod nazivom GPLib. Pokretanje izvršnog fajla otvara prozor koji je prikazan na Slici 5. Taj prozor sadrži dijalog koji omogućava unos podataka o nazivu fajla u kojem će biti smešteni rezultati eksperimenta. Na unet naziv program će automatski dodati ekstenziju .txt. Ukoliko se ništa ne menja u polju sa imenom, fajl sa podacima će nosti naziv student.txt. Pri dnu prozora, sa leve strane nalazi se padajući meni koji omogućava izbor ekperimenta koji će biti pokrenut. Konačno, pri dnu prozora, sa desne strane, nalazi se polje sa oznakom „START“. Pritiskom na ovo polje pokreće se eksperiment. Po završetku eksperimenta, iz programa se izlazi pritiskom na polje „x“ u gornjem desnom uglu.

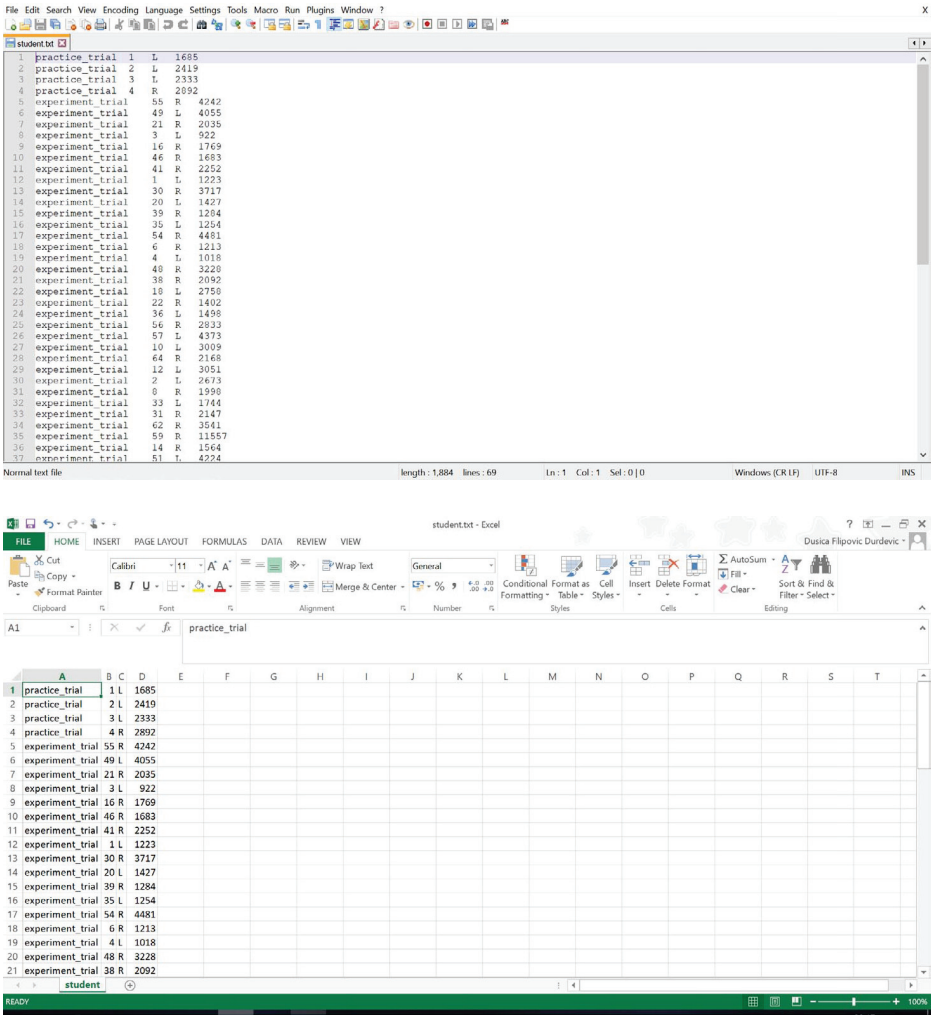


Slika 5. Prozor za pokretanje eksperimenta u programu UltraLab 1.2.1, koji se dobija pokretanjem izvršnog fajla UltraLab1.2.2.jar.

Eksportovanje prikupljenih podataka

Podaci se čuvaju u tekstualnom fajlu čiji naziv sadrži tekst koji je unet u polje „Naziv izlaznog fajla“ i ekstenziju .txt. Po svom formatu ovo je tekstualni fajl čiji sadržaj je delimitiran tabovima (engl. *text tab delimited*) i on se može, za potrebe dalje analize, otvoriti u običnom tekstualnom editoru, programima kao što su MS Excel, LibreOffice Calculator, ali i bilo kom programu za statističku obradu podataka.

Primer fajla sa podacima dat je na Slici 6. U ovom prikazu se može videti da prva kolona sadrži podatak o tome da li podaci potiču iz vežbe (practice_trial) ili glavnog dela eksperimenta (experiment_trial). Druga kolona sadrži redni broj zadatka i ona može da posluži za sortiranje podataka i spajanje sa kodovima i ostalim merama koje su potrebne za analizu. Treća kolona sadrži podatak o odgovoru ispitanika, što je od značaja za analizu grešaka. U ovoj koloni moguće su vrednosti L (pritisnut levi taster miša), R (pritisnut desni taster miša) i t/o (time-out, vreme za odgovor je isteklo, ispitanik nije dao odgovor). Konačno, poslednja, četvrta kolona sadrži vremena reakcije (u slučaju vrednosti t/o u prethodnoj koloni, vrednost iz kolone sa vremenima reakcije treba ignorisati).



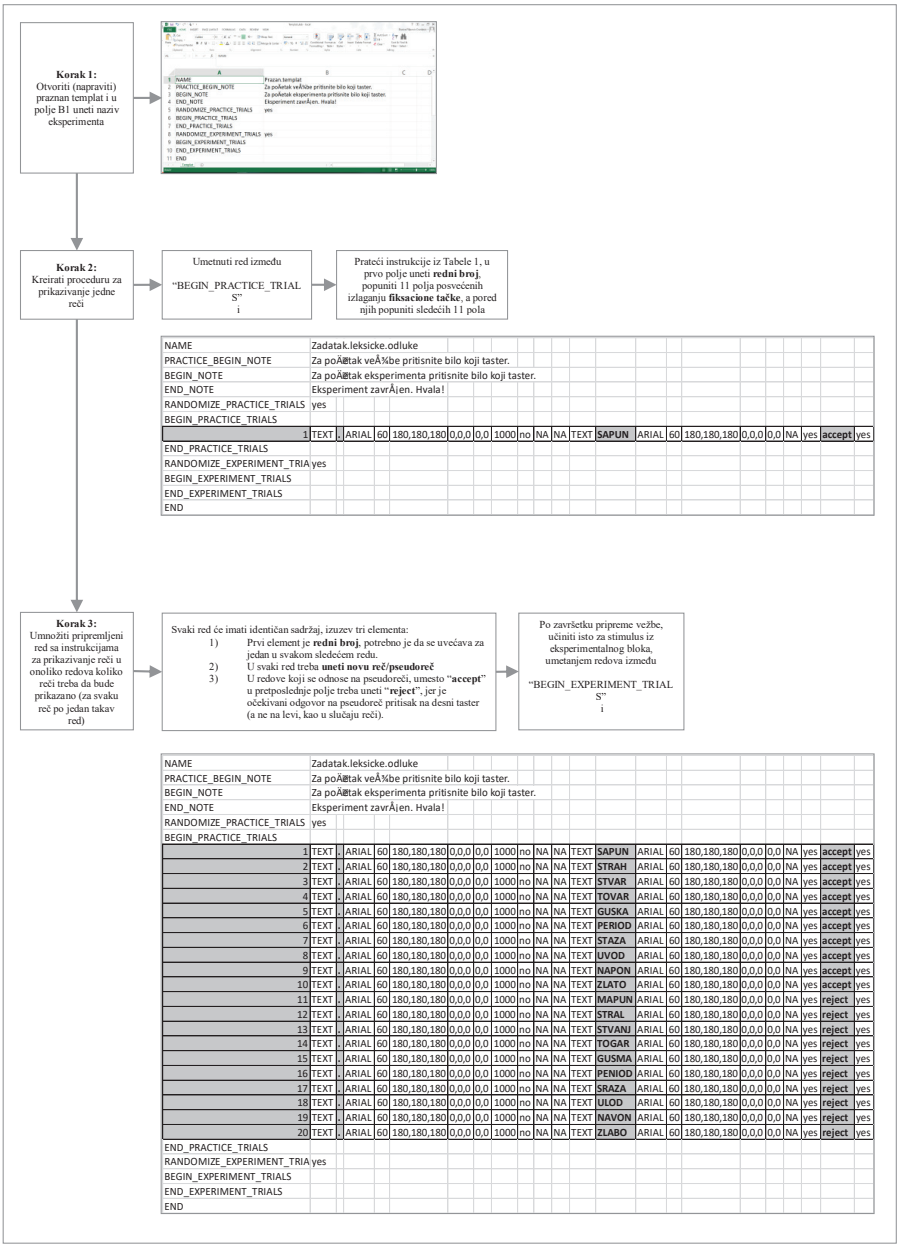
Slika 6. Prikaz dela fajla sa podacima ispitanika u tekstualnom editoru (gore) i u MS Excel-u (dole).
https://github.com/dfdurdevic/UltraLab/blob/main/student.txt.

Ilustracija primene UltraLaba na primeru

Primenu UltraLaba ilustrovaćemo i na konretnom primeru. U tu svrhu oslonićemo se na zadatak leksičke odluke koji smo koristili i u delu za validaciju (Filipović Đurđević, 2014; Filipović Đurđević & Kostić, 2009; Filipović Đurđević & Kostić, 2021). Ovaj eksperiment počinjao je izlaganjem stimulusa za vežbu (10 reči i 10 pseudoreči), nakon čega je sledio eksperimentalni blok

sa 160 reči i 160 pseudoreči. Na početku svakog merenja, na sredini ekrana izlagana je fiksaciona tačka u trajanju od 1000ms, nakon koje se na sredini ekrana pojavljivala reč/pseudoreč za koju je sniman odgovor. Odgovori su davani putem miša, pri čemu je tačan odgovor za reči mapiran na levi, a tačan odgovor za nereči mapiran je na desni taster miša. Svi stimulusi prikazivani su fontom Arial, veličine 60.

Korake koje treba pratiti u ovoj proceduri ilustrovali smo šemom predstavljenom na Slici 7. Važno je primetiti da postoje tri ključna koraka: 1) početak od jednostavnog formulara (https://github.com/dfdurdevic/UltraLab/blob/main/Templat.ulab), 2) kreiranje linije koja upravlja prikazivanjem jednog niza stimulusa na koje se daje odgovor i 3) umnožavanje tog reda za potrebe vežbe i eksperimentalnog bloka. Ovo umnožavanje podrazumeva kopiranje najvećeg dela prvopripremljenog reda, uz zamenu samo tri elementa: 1) rednog broja merenja (svaki red treba da nosi za jedan veći redni broj), 2) zamenu reči/pseudoreči koja će biti prikazana i 3) promenu ključne reči „accept“ u „reject“ za one redove koji se odnose na pseudoreči. Treba imati u vidu da se fajl sa ovim instrukcijama, u svrhu lakšeg uređivanja, može otvoriti u MS Excelu (ili sličnom programu), ali da treba da bude sačuvan kao tekstualni fajl sa ekstenzijom .ulab.



NAME	Zadatak.leksicke.odluke
PRACTICE_BEGIN_NOTE	Za poÃetak veÅ¾be pritisnite bilo koji taster.
BEGIN_NOTE	Za poÃetak eksperimenta pritisnite bilo koji taster.
END_NOTE	Eksperiment zavrÅ¡en. Hvala!
RANDOMIZE_PRACTICE_TRIALS	yes
BEGIN_PRACTICE_TRIALS	
1	TEXT . ARIAL 60 180,180,180 0,0,0 0,0 1000 no NA NA TEXT **SAPUN** ARIAL 60 180,180,180 0,0,0 0,0 NA yes **accept** yes
END_PRACTICE_TRIALS	
RANDOMIZE_EXPERIMENT_TRIA	yes
BEGIN_EXPERIMENT_TRIALS	
END_EXPERIMENT_TRIALS	
END	

NAME	Zadatak.leksicke.odluke
PRACTICE_BEGIN_NOTE	Za poÃetak veÅ¾be pritisnite bilo koji taster.
BEGIN_NOTE	Za poÃetak eksperimenta pritisnite bilo koji taster.
END_NOTE	Eksperiment zavrÅ¡en. Hvala!
RANDOMIZE_PRACTICE_TRIALS	yes
BEGIN_PRACTICE_TRIALS	
1	TEXT . ARIAL 60 180,180,180 0,0,0 0,0 1000 no NA NA TEXT **SAPUN** ARIAL 60 180,180,180 0,0,0 0,0 NA yes **accept** yes
2	TEXT . ARIAL 60 180,180,180 0,0,0 0,0 1000 no NA NA TEXT **STRAH** ARIAL 60 180,180,180 0,0,0 0,0 NA yes **accept** yes
3	TEXT . ARIAL 60 180,180,180 0,0,0 0,0 1000 no NA NA TEXT **STVAR** ARIAL 60 180,180,180 0,0,0 0,0 NA yes **accept** yes
4	TEXT . ARIAL 60 180,180,180 0,0,0 0,0 1000 no NA NA TEXT **TOVAR** ARIAL 60 180,180,180 0,0,0 0,0 NA yes **accept** yes
5	TEXT . ARIAL 60 180,180,180 0,0,0 0,0 1000 no NA NA TEXT **GUSKA** ARIAL 60 180,180,180 0,0,0 0,0 NA yes **accept** yes
6	TEXT . ARIAL 60 180,180,180 0,0,0 0,0 1000 no NA NA TEXT **PERIOD** ARIAL 60 180,180,180 0,0,0 0,0 NA yes **accept** yes
7	TEXT . ARIAL 60 180,180,180 0,0,0 0,0 1000 no NA NA TEXT **STAZA** ARIAL 60 180,180,180 0,0,0 0,0 NA yes **accept** yes
8	TEXT . ARIAL 60 180,180,180 0,0,0 0,0 1000 no NA NA TEXT **UVOD** ARIAL 60 180,180,180 0,0,0 0,0 NA yes **accept** yes
9	TEXT . ARIAL 60 180,180,180 0,0,0 0,0 1000 no NA NA TEXT **NAPON** ARIAL 60 180,180,180 0,0,0 0,0 NA yes **accept** yes
10	TEXT . ARIAL 60 180,180,180 0,0,0 0,0 1000 no NA NA TEXT **ZLATO** ARIAL 60 180,180,180 0,0,0 0,0 NA yes **accept** yes
11	TEXT . ARIAL 60 180,180,180 0,0,0 0,0 1000 no NA NA TEXT **MAPUN** ARIAL 60 180,180,180 0,0,0 0,0 NA yes **reject** yes
12	TEXT . ARIAL 60 180,180,180 0,0,0 0,0 1000 no NA NA TEXT **STRAL** ARIAL 60 180,180,180 0,0,0 0,0 NA yes **reject** yes
13	TEXT . ARIAL 60 180,180,180 0,0,0 0,0 1000 no NA NA TEXT **STVANJ** ARIAL 60 180,180,180 0,0,0 0,0 NA yes **reject** yes
14	TEXT . ARIAL 60 180,180,180 0,0,0 0,0 1000 no NA NA TEXT **TOGAR** ARIAL 60 180,180,180 0,0,0 0,0 NA yes **reject** yes
15	TEXT . ARIAL 60 180,180,180 0,0,0 0,0 1000 no NA NA TEXT **GUSMA** ARIAL 60 180,180,180 0,0,0 0,0 NA yes **reject** yes
16	TEXT . ARIAL 60 180,180,180 0,0,0 0,0 1000 no NA NA TEXT **PENIOD** ARIAL 60 180,180,180 0,0,0 0,0 NA yes **reject** yes
17	TEXT . ARIAL 60 180,180,180 0,0,0 0,0 1000 no NA NA TEXT **SRAZA** ARIAL 60 180,180,180 0,0,0 0,0 NA yes **reject** yes
18	TEXT . ARIAL 60 180,180,180 0,0,0 0,0 1000 no NA NA TEXT **ULOD** ARIAL 60 180,180,180 0,0,0 0,0 NA yes **reject** yes
19	TEXT . ARIAL 60 180,180,180 0,0,0 0,0 1000 no NA NA TEXT **NAVON** ARIAL 60 180,180,180 0,0,0 0,0 NA yes **reject** yes
20	TEXT . ARIAL 60 180,180,180 0,0,0 0,0 1000 no NA NA TEXT **ZLABO** ARIAL 60 180,180,180 0,0,0 0,0 NA yes **reject** yes
END_PRACTICE_TRIALS	
RANDOMIZE_EXPERIMENT_TRIA	yes
BEGIN_EXPERIMENT_TRIALS	
END_EXPERIMENT_TRIALS	
END	

Slika 7. Šematski prikaz procedure kreiranja eksperimentalnog fajla za eksperiment sa zadatkom vizuelne leksičke odluke.
https://github.com/dfdurdevic/UltraLab/blob/main/Zadatak_Leksicke_Odluke.ulab.

Diskusija

U ovom radu opisali smo slobodnu softversku aplikaciju UltraLab, koju smo kreirali sa ciljem da damo doprinos rastućem trendu širenja znanja iz oblasti psihologije kroz neposredno iskustvo sa izučavanim fenomenima i kroz usavršavanje veština izvođenja psiholoških eksperimenata. Verujemo da smo taj doprinos dali time što smo ponudili aplikaciju koja nastavlja trend pojednostavljivanja procesa kreiranja i zadavanja eksperimenata, kao i time što smo ponudili prvu bazu klasičnih eksperimentalnih paradigmi na srpskom jeziku.

Poređenjem sa dve široko rasprostranjene i temeljno testirane softverske aplikacije pokazali smo da je merenje u okviru softvera UltraLab istovremeno i pouzdano i validno. Poredili smo ga sa komercijalnim softverom SuperLab (Cedrus Corporation, San Pedro, CA), koji je u upotrebi dugi niz godina i sa softverom otvorenog koda OpenSesame (Mathôt et al., 2012), koji predstavlja jednu od najčešće korišćenih softverskih aplikacija u eksperimentalnoj psihologiji danas. Zaključili smo da je UltraLab pouzdan i validan softver (u psihometrijskom smislu) i to u istoj meri u kojoj su to dve odabrane aplikacije.

Jednostavnost zadavanja eksperimenta upotrebom alata UltraLab ogleda se u činjenici da ona ne zahteva prethodnu instalaciju, već se oslanja na platformu koja je tipično prisutna na većini računara. Jednostavnost uređivanja eksperimenta u ovom programu predstavlja to što eksperimentator nije prinuđen da menja ništa osim linija koje definišu same zadatke. Jednu liniju uređuje tako što osmisli redosled stimulusa unutar zadatka i uslove pod kojima se izlažu, a onda to definiše nizanjem sekvenci od 11 predefinisanih polja. Kada završi sa uređivanjem jednog reda, odnosno jednog zadatka (trajla), sve ostale će jednostavno definisati tako što kopira ovaj red onoliko puta koliko će merenja sadržati eksperiment. Nakon toga, potrebno je samo da u polja koja sadrže sam sadržaj koji će biti prikazan (tekst ili naziv fajla) kopira vrednosti iz tabele u kojoj su pripremani stimulusi prema kodnom stablu. Fleksibilnost alata UltraLab ogleda se u velikom broju različitih eksperimentalnih paradigmi koje je moguće sprovesti kombinovanjem jednostavnih sekvenci instrukcija kojima je moguće opisati prikazivanje različitih tipova stimulusa pod različitim uslovima.

Prilika da student na času iskusi eksperiment izvesno doprinosi razumevanju gradiva. Međutim, uz pomoć alata UltraLab, student svako istraživanje iskusi najpre kao ispitanik, a potom i kao istraživač. Diskutovaćemo prednosti ovog vida praktične nastave polazeći upravo od ove dve uloge. Učinićemo to na osnovu višegodišnjeg iskustva u primeni alata UltraLab na Univerzitetu u Novom Sadu, gde je alat razvijan, kao i Univerzitetu u Beogradu (a od nedavno je u upotrebi i na Univerzitetu u Banjoj Luci). Činjenica da prolazi kroz ulogu ispitanika, čini da student mora dodatno kognitivno da se angažuje da bi razumeo svoj zadatak, čime se dublje obrađuje informacija i pomaže pamćenje. Time prisećanje detalja nekog eksperimenta nije samo pobuđivanje, odnosno izvlačenje semantičkih znanja, već i epizodičkih. Na ovaj

način, osobina epizodičke memorije da ispoljava veću otpornost na zaboravljanje postaje prednost ovakvog nastavnog metoda, jer stečenom znanju daje duži rok (Jeunehomme et al., 2018; Kristo et al., 2009; Linton, 1978; Wagennar, 1986). Činjenica da student aktivno učestvuje u analizi podataka dodatno produbljuje obradu nastavnog gradiva. To što svako analizira sopstvene podatke ima dvostruku korist. S jedne strane, svaki student analizira različite rezultate. Na taj način stiče osećaj o nepozudanosti istraživanja sprovedenih na malim uzorcima (Button et al., 2013; Kühberger et al., 2014). Još važnije, na taj način se svaki student angažuje u procesu interpetiranja različitih obrazaca rezultata i poređenja posledica koje ti različiti obrasci imaju po status teorije iz koje su izvedene pretpostavke koje se testiraju u datom eksperimentu. Time vežba kritičko mišljenje i priprema se za ulogu budućeg istraživača, bez obzira na to da li se priprema za primenjena ili akademska istraživanja. Konačno, činjenica da svaki student analizira sopstvene rezultate predstavlja motivišući faktor za svakog studenta i dodatno ga podstiče da se udubi u proces interpretacije i razumevanja dobijenih rezultata.

Sve ove prednosti direktnog iskustva sa psihološkim eksperimentima nisu nepoznanica nastavnicima psihologije, a tokom poslednjih godina sve većom brzinom raste ponuda različitih platformi koje pomažu ovaj aspekt nastavnog procesa. Premda naš cilj nije bio da kreiramo aplikaciju koja će prevazići performanse aplikacija koje se sve više usavršavaju i nude istraživačima, nastavnicima i studentima širom sveta, verujemo da smo kreirali softver koji ima dodatnu prednost. Tu, dodatnu prednost predstavlja izuzetno strma kriva učenja principa na kojima se zasniva priprema eksperimenata u programu UltraLab. Na osnovu bogatog pedagoškog iskustva prve autorke, stečenog tokom dve decenije obučavanja mladih eksperimentalnih psihologa, procenjujemo da trenutno ne postoji program koji je zasnovan na jednostavnijem principu kreiranja eksperimentalnog fajla. Poređenja radi, da bi kreirali neki jednostavni eksperiment u programima kao što su OpenSesame ili PsychoPy, istraživači mogu da „prevlačenjem“ ikonica kreiranju pojedinačne elemente eksperimenta, a potom unutar svakog definišu različite parametre. Umnožavanje podešavanja za potrebe većeg broja stimulusa može da se postigne kopiranjem unapred pripremljenog spiska, što predstavlja značajnu uštedu u već olakšanom procesu pripreme eksperimenta. Međutim, čak u odnosu na ovako jednostavan proces pripreme, UltraLab nudi dodatno olakšanje, jer se oslanja na funkcionalnost softvera MS Excel (i njemu sličnih aplikacija), kao što je ilustrovano u tekstu.

Konačno, gotova rešenja koja smo pripremili, a koja predstavljaju implementacije nekoliko najpoznatijih eksperimentalnih paradigmi i demonstriraju nekoliko klasičnih fenomena koji se obrađuju u nastavi kognitivne psihologije, prema našem saznanju, predstavljaju jedini takav izvor pripremljen na srpskom jeziku.

Zaključak

Ponudili smo softver koji je slobodan, a fleksibilan i jednostavan za upotrebu, za koji verujemo da može da učini studentima znanja iz eksperimentalne psihologije dostupnijim, a nastavnicima obogati sadržaje i pojednostavi pripremu nastave. UltraLab program, čija je poslednja verzija u trenutku pisanja ovog rada 1.2.1, dostupan je na: https://osf.io/enwgm/?view_only=c03dc7db0d664c1a9a87718100149b01.

U arhiviranom fajlu se, pored samog programa, nalazi i skup prethodno pripremljenih eksperimenata iz oblasti kognitivne psihologije. Pored toga, različiti materijali koji mogu biti od pomoći, biće postavljani i u repozitorijum na ovoj lokaciji: https://github.com/dfdurdevic/UltraLab.

Finansiranje

Ovaj rad finansiran je sredstvima Ministarstva za prosvetu, nauku i tehnološki razvoj Republike Srbije (evidencioni broj projekta 179006 i 179033).

Sukob interesa

Nemamo sukob interesa za prijavljivanje.

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ULTRALAB – FREE SOFTWARE FOR CONDUCTING PSYCHOLOGY EXPERIMENTS

The main goal of this paper is to present a new tool for preparing and conducting the psychological experiments which we created to enrich and facilitate the education process within the practicals in the area of cognitive psychology and related fields. It has been designed as an aid in the teaching process at the university level, but due to its simplicity it can easily be applied at earlier levels of schooling as well. We described a computer program UltraLab which created with an idea to follow contemporary trends and be a software which is free, very simple to use in preparing and conducting the experiments, and yet flexible – it can cover a wide range of experimental paradigms. A download link is provided as well. In this paper we describe the basic technical features, give detailed instructions for the preparation of experimental files, as well as for reading the data files. Finally, we point out the advantages which the application of this tool brings to the students who are acquiring the knowledge of experimental psychology.

Keywords: experiment, software, teaching, Java, psychology

PRIMENJENA PSIHOLOGIJA, 2021, Vol. *14* (1), STR. 33-52

UDK: 159.9.955.072
Research Article
doi: https://doi.org/10.19090/pp.2021.1.33-52

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Received: 08.10.2020.
Correction received: 22.03.2021.
Accepted: 29.03.2021.

ROLE OF AUTOMATIC, CONSCIOUS, AND UNCONSCIOUS THOUGHT PROCESSES IN COMPLEX DECISION MAKING

A complex decision is any decision that includes choosing among options with numerous describing attributes. Certain decisions are fast, often guided with automatic thought processes, while other decisions are made with careful examination of all the factors. The aim of this research was to investigate the effect of automatic, conscious and unconscious thought processes in the context of decision making. Participants were psychology students aged between 19 to 28 years. The first experiment investigated the role of these three different thought processes on choosing a subjectively best apartment option and take-the-best (TTB) heuristic apartment option. The second experiment investigated metacognitive aspects of decision making, precisely to determine the differences in feeling of rightness (FOR) as well as the tendency to change the decision about the chosen apartment, depending on the activated thought processes. Different thought processes determined the choice of the subjectively best option. Participants chose the subjectively best option in the conscious thought condition more often than in the automatic or unconscious thought condition. However, there was no difference between conditions in choosing the TTB heuristic option. No difference was found between the automatic and unconscious thought condition concerning the metacognitive assessment of feeling of rightness, while the same increased equally in participants of both conditions after they were subsequently included in the conscious thought condition. The tendency to change responses after engaging in a conscious thought condition also did not depend on the initial condition. The study provided support for the importance of conscious thought processes in complex decision making present in everyday functioning and regardless of the field of human expertise.

Keywords: decision making, conscious thought processes, unconscious thought processes, automatic thought processes, feeling of rightness

Introduction

Decision making often goes unnoticed because it implies a simple decision in our everyday activities. However, sometimes we engage in complex decision making, which includes choosing among options with numerous describing attributes. Two of the most interesting questions in this context are (1) how we make our mind when faced with complex problems, and (2) how much confidence do we have in our choices afterwards, depending on previous underlying decision-making processes upon which our choice was shaped. Regarding the former, our decisions are based on two types of thought processes, according to the Dual Process Theory. Type 1 processes are fast, automatic and often based on heuristic reasoning (Evans & Stanovich, 2013; Ferreira et al., 2006). A heuristic is a strategy that ignores part of the information in order to make decisions more quickly and accurately than more complex methods (Gigerenzer & Gaissmaier, 2011). On the other hand, Type 2 processes are responsible for reflective thinking and the imagination of possible hypothetical scenarios of different options (Evans & Stanovich, 2013). The second question implies the metacognitive aspect of our decision-making process. Metacognition refers to the thoughts that an individual has about his own thoughts and cognitive processes (Flavell, 1979). Some researchers claim that while faced with a dilemma, the answer that pops in our mind very fast (Type 1 processes) is usually the intuitive answer which does not have to be the correct one, but its' brief appearance makes it seem reliable and brings us confidence in our intuitive decision, much more than in equally valid (or even more valid) non-intuitive alternatives (Simmons & Nelson, 2006). However, reducing intuitive confidence can reduce intuitive biases. Thompson et al. (2011) researched various reasoning tasks and evaluated the participants' metacognitive confidence of their response, also known as Feeling of Rightness (FOR). The results showed that low FOR values correlated with more time spent thinking and the higher probability of changing the response (Thompson et al., 2011; Thompson & Wang, 2019). In other words, they also showed that higher FOR estimates might prevent us from engaging in analytical (Type 2) processes due to the fluency (ease) with which the initial decision was produced. Furthermore, Ghazal et al. (2014) have confirmed that metacognitive processes are correlated with exam performance. Their participants showed better performance when they had more time to think and evaluate their decision (Type 2 processes).

Hence, we are taught to believe that conscious and rational decision-making (engagement in Type 2 processes) is a path to making the best decision leading to the best outcomes, but some researchers have tried to refute that belief. Besides researching automatic, fast and heuristic, as well as conscious, decision making (Kahneman, 2011), some authors proposed that decision making can be done unconsciously (Dijksterhuis, 2004). Conscious thought processes are activated when a person is consciously aware of their cognitive processes needed to solve a problem or make a decision. Unconscious thought

processes imply that a person is not consciously aware of attending to a specific task or problem (Dijksterhuis, 2004). For example, if a conscious thought process is activated while deciding where to live, a person would be thinking about the apartment's price but as well about the location, trying to decide which aspect is more important. If an unconscious thought process is responsible for decision making, then a person would stop actively thinking about it and would engage in another activity and later suddenly come to a decision without knowing a specific reason behind it. Therefore, conscious and unconscious thought processes differ in the awareness of cognitive processes needed to solve a problem, yet they both engage in delayed decision making, while on the other hand, automatic decision making happens immediately upon facing a problem (Kahneman, 2011).

Dijksterhuis (2004) researched whether the quality of decision making depends can be enhanced by activation of unconscious thought processes. His participants were students who had to imagine choosing an apartment to live in. The stimuli consisted of various attributes describing those apartments (12 for each apartment). They had to choose between four options. The decision quality criterion was based on the TALLY rule, which considers the choice with the largest number of positive attributes (e.g., Apartment B is in the city centre) as the best one (Dijksterhuis, 2004). In all three conditions, apartment attributes were presented to participants in a one-by-one fashion for a few seconds (three minutes overall) labelled with apartment letter they belonged to in random order. In the automatic thought condition, the decision was made right after the stimuli presentation, while in the conscious thought condition, participants had three minutes to make a decision in front of the blank screen. In unconscious thought condition, the decision was made after three minutes spent solving unrelated tasks. The results indicated that the participants in the unconscious thought condition were able to make the best decision. Specifically, they had estimated Apartment B (an objectively best option with the highest number of positive attributes) as the most desirable apartment significantly more than the rest of the participants from conscious or immediate thought condition. Dijksterhuis et al. (2006) confirmed his hypotheses and claimed that unconscious thinking enhances the quality of decision-making. Some everyday examples of that are evident in a famous saying, "Sleep on it", which points out the benefits of deciding with a time delay.

These brave, controversial, and somewhat orthodox claims raised concerns and gained public attention from the pioneers in the field. His findings were faced with numerous calls on potential methodological flaws, especially regarding the duration of conscious thought condition, as well as the application of the TALLY task paradigm. Regarding the latter, he did not take into consideration the fact that people value differently the same attributes. In other words, while for someone it might be ideal to live in the city centre, for someone else it might be a nuisance. Some researchers have tried to replicate those findings with slight modifications of experimental design regarding the

conscious thought condition. Rey et al. (2008) tried to enhance the primary purpose of conscious thinking by activating the Type 2 processes but kept the TALLY paradigm. The immediate thought condition is supposed to be heuristically driven, but the conscious thought condition needs to offer enough time for the activation of Type 2 processes. That is why Rey et al. (2008) gave their participants unlimited time in the conscious thought condition, but regardless, they did not manage to find a significant difference in the quality of decision making between conscious and unconscious thought condition. However, the most important modifications were done by Newell et al. (2009). In contrast to previous experiments that considered the best apartment as the one with more positive and less negative attributes, Newell et al. (2009) proposed a WADD (weighted-additive) model as a more reliable solution compared to the TALLY rule. The WADD model enables the researcher to create options while taking into consideration the participants' importance estimates of all attributes. Using this model, Newell et al. (2009) created the best apartment option, which had the highest sum of attribute values and also gave the participant a longer time in conscious condition (4 minutes with a blank screen). Still, they did not find a significant difference regarding the thought conditions.

One could argue that the application of the WADD model in experimental designs is crucial from the perspective of construct validity. The researcher shouldn't decide which option is the best for the participants but rather let the participants estimate their best option in complex decisions. Although the WADD model used in the research done by Newell et al. (2009) is considered a great improvement, we believe that the WADD option can be modified even more carefully – by making it a subjectively best option for each participant rather than an objectively best option for everyone.

The present study

In this study, we focused on WADD based subjective decision making, additionally exploring take-the-best (TTB) heuristic and metacognitive aspects of decision making. There are no prior studies that tried to incorporate the subjective WADD paradigm, especially by simultaneously examining the effect of the TTB heuristic. Our goal was to construct another apartment option (besides the rational one used in prior studies) that should act as a heuristic for participants of all conditions, that is, to create a TTB heuristic option. This heuristic is specific because it is guided with finding at least one plausible argument of an option and ignoring the rest (Gigerenzer et al., 1999). For example, when choosing an apartment, someone might only care for the rent expense and make their decision disregarding any other attribute. Heuristics are considered part of Type 1 processes (Kahneman, 2011) that should prevail when deciding automatically in contrast with a rational option that should draw us more when conscious thought processes are triggered. All of the prior studies

only created the objectively best rational apartment option, alongside three other much obviously worse options. Our study incorporated both rational and heuristic apartment options, alongside two additional, more obviously worse options. By creating two different options – rational and heuristic, we believe that we can adequately examine the effect of different thought processes in making the best decision end enhance the external validity of the findings given that real-life complex decision making is usually much harder, and besides the best (or most rational) option incorporates one or many heuristic options to choose from. Alongside that, little is known about the metacognitive aspects of complex decision making, especially regarding unconscious thought processes. As mentioned earlier, automatic thought processes can turn us overconfident and prevent us from engaging in deeper processing. On the other hand, reducing confidence bias can also reduce intuitive response bias and activate Type 2 processes which should lead us to think over and change our decision (Simmons & Nelson, 2006; Thompson et al., 2011; Thompson & Wang, 2019). However, little is known about the metacognitive aspects of the unconscious thought process. To our best knowledge, the study of Dehghan et al. (2011) is the only one in this regard. The authors replicated Dijksterhuis and van Olden (2006) study about choice satisfaction and asked the participants to choose one poster they liked the most and to take it home with them. Ten days later, participants in the unconscious thought condition showed significantly less satisfaction than did participants in the conscious and immediate condition.

Taking all into account, we conducted two experiments in order to examine the role of automatic, conscious and unconscious thought processes in complex decision making, specifically in choosing a place of residence, following the task stimuli of the earlier studies (Dijksterhuis, 2004; Newell et al., 2009; Payne et al., 2008; Rey et al., 2008). The purpose of Experiment 1 was to develop a method that would enable computing subjectively best decision options of each participant in contrast to previously researched objective best options, along with examining the effect of the TTB heuristic. We also tried to further alleviate critics regarding the duration of the conscious condition by extending it to 4 minutes and allowing participants to see all attributes for all four options at once. In Experiment 2, we examined the feeling of rightness (FOR) for the response given before and after engaging subjects from automatic and unconscious experimental conditions into the conscious one as well as their tendency to change the initial response after activation of conscious thought processes. In other words, we sought to get deeper insight regarding two important questions: (1) will the FOR values change and will the change rate be different or the same for the participants from the automatic and unconscious condition after giving them a chance to consciously consider the available options afterwards, and (2) will there be a change of heart regarding their final decision and would that change be dependant upon the initial condition.

Experiment 1

In Experiment 1, we examined the effect of different thought processes in choosing the subjectively best or heuristic option.

Based on previous findings (Gigerenzer et al., 1999; Kahneman, 2011), we hypothesized (a) that participants in the automatic thought condition will choose the heuristic option more often than the participants in conscious or unconscious thought condition. Further, we hypothesized (b) that participants in the conscious thought condition will choose their subjectively best option (high congruency of choice) more often than the participants in automatic or unconscious thought condition.

Method

Participants

One hundred and twenty-six (n_f = 114; n_m = 12) psychology students from the Catholic University of Croatia participated in the first experiment. They were aged from 19 to 28 years (M = 21.15; SD = 1.62). All of them received course credit for participating in the research.

Stimuli

The experimental stimuli were acquired from experiments conducted by Dijksterhuis (2004) and Newell et al. (2009). The researchers used a list of 16 attributes describing apartments which seem to be important in deciding on where to move in. We translated those attributes (from English to Croatian) and added another four that might be more relevant for Croatian students, therefore using 20 attributes in pilot research conducted on graduate psychology students of the same university (N = 36). Participants had to evaluate the importance of each given attribute on a scale from 1-10 (1 meaning *the attribute is not rather important to them*, and 10 meaning *the attribute is extremely important in deciding on where to live*). Later, we computed mean scores for each attribute and chose 5 with the highest and 5 with the lowest mean value. Those ten attributes were the final stimuli for the main experiment. Each attribute had two values – a positive and a negative one. For example, rent as an attribute could have been high or low (negative or positive), varying throughout four different options (apartment A, B, C and D).

While creating four apartment options, we followed the *WADD* model. We created one option (apartment C) that is supposed to be objectively the best, meaning it has the highest sum of its attribute values. It was also a rational decision because while reflecting on the attributes, one can notice its greater value. Another important option is apartment B which was created to be a heuristic decision, precisely TTB heuristic. Options B and C were created based

on the results of the pilot study. Apartment B was considered as a heuristic because it has low rent, nearby public transport and Internet access which were the three most important attributes according to the pilot study. Apartments A and D had inverted values of apartment B and C. They were not crucial for our hypotheses and were only there to make the task more complicated.

Procedure

Randomly assigned participants sat in a computer room in front of a PowerPoint presentation. On the first slide, there was the following instruction: *"Imagine that you are planning to rent a flat near a university because you have been living in a faraway suburb. After putting effort into finding an apartment, you are left with four apartments on your list. The new semester is starting soon, so you have to make your decision. You will see attributes describing each of 4 apartments, and eventually, you will have to choose the best apartment"*.

In each condition, participants viewed the same stimuli (10 attributes for each apartment), and at the end of the slide show, there was a link to the survey. The first question was: "*Which apartment would you choose?*". Afterwards, they answered other questions regarding the importance of attributes, evaluated other apartments, and wrote down the attributes they recall for each apartment.

Conditions differed in the time participants spent thinking about the apartments before making a decision. In all three conditions, participants read about each apartment for 25 seconds. In automatic thought condition, the decision was made right after viewing the attributes, meaning they had no time to think actively and therefore made a quick decision. In conscious thought condition, after viewing the attributes, they had 4 minutes to think about them, meanwhile looking at the screen with four apartments accompanied by a total of 40 attributes. They were given this time to compare the options and to engage in a conscious, active decision-making process. In the unconscious thought condition, after viewing the attributes, participants also had 4 minutes before making a decision. However, this time they were distracted in order not to think actively about the decision they will have to make. For 4 minutes, they were solving anagrams and concentration grids. This experiment provided more time in the conscious thought condition in comparison to the 3 minutes provided in the original experiment (Dijksterhuis, 2004) because we wanted to offer more time to engage Type 2 processes. Other than the time frame, the modification in the procedure was made in stimuli presentation as well because in this condition, they had a chance to look at all 40 attributes and examine them carefully to make a rational decision.

Design

In Experiment 1, we employed an independent groups design, with participants randomly assigned to one of the three conditions: automatic, conscious and unconscious thought condition (42 participants assigned to each).

Results

The statistical analysis for Experiment 1 was conducted on 124 participants (two were excluded due to missing data on certain variables). The frequency of choosing one of the four apartments is presented in Figure 1. The most commonly chosen option was apartment C (n = 60 (48.4%)), and the following was apartment B (n = 50 (40.3%)).

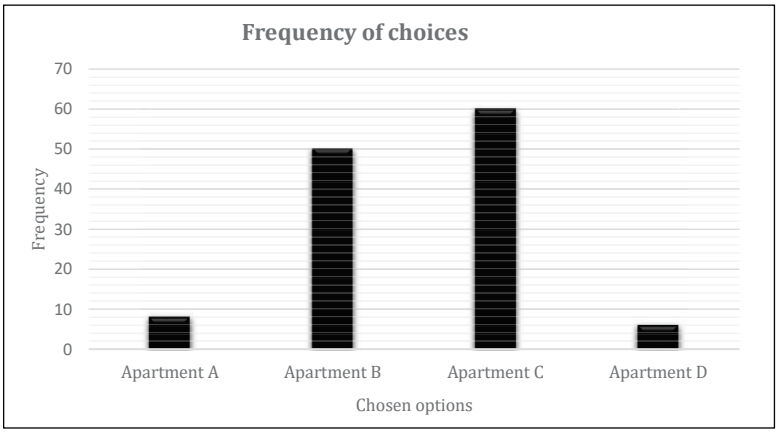

Figure 1. Frequency of choosing different options overall.

To examine the effect of experimental condition on apartment decision, we did a chi-square analysis. Table 1 shows the correlation between experimental condition and apartment decision. Results showed the dependence of participants' decision on the experimental condition ($\chi 2(6) = 18.33$, $p < .01$, Cramer's $V = 0.26$). Further post-hoc analysis with Bonferroni correction of adjusted residuals showed the more frequent choice of Apartment A in the unconscious in comparison to two other conditions, and more often the choice of apartment D in the automatic in comparison to two other conditions. Considering these findings, we rejected the first hypothesis, in which we expected that the participants of automatic thought condition would be more inclined to choose a heuristic option (apartment B). Results showed that approximately the same number of participants chose apartment B in all three conditions.

Table 1
Distribution of chosen options depending on the experimental condition

		Experimental condition			
		Automatic	Conscious	Uncon-scious	Total
Aparment A	Frequency	2	0	6	8
	Adjusted residuals	-0.50	-2.10	2.70	
Aparment B	Frequency	16	21	13	50
	Adjusted residuals	-0.40	1.60	-1.20	
Aparment C	Frequency	19	21	20	60
	Adjusted residuals	-0.50	0.30	0.20	
Aparment D	Frequency	5	0	1	6
	Adjusted residuals	2.60	-1.80	-0.80	
	Total	42	42	40	124

To test the second hypothesis (b), we created a new variable called the WADD value. First, we considered estimates that each participant made about every attribute on a scale of 1-10. Then we combined this variable with the question about the preferred alternative of each attribute. For example, one might estimate his importance of the size of the apartment with a high number such as 8. There are two alternatives to this – a small apartment or a big apartment. If someone is highly motivated to get a big apartment, then every option showing that feature (Apartment A and C) could be desirable. At the same time, every option of offering a small apartment would be extremely unattractive. To estimate the best option for every participant (subjectively best decision) according to the WADD model, we had to calculate those values of each attribute and change their sign depending on the preferable alternative of each attribute. For example, if someone valued the size of an apartment as an 8, and also preferred a big apartment, then in the total sum of WADD values, 8 would be positive (+8) for apartment A and C, but negative (-8) for apartment B and D. Using this formula we calculated *WADD* values for each apartment and participant. The highest WADD value of one apartment represented the subjective best option for that person, and we could examine in which condition they were more likely to choose this option. Another new variable was choice congruency which implied that a person chose their subjectively best apartment. On the other hand, if one had chosen apartment B even though his/her highest WADD value is for apartment C, then the choice was incongruent.

We conducted a chi-square analysis to investigate choice congruency dependence on the experimental condition. We expected higher congruency in the conscious thought condition. The results (Table 2) showed a significant difference in making incongruent choices between three experimental conditions ($\chi 2(2) = 7.09$, $p < .05$, Cramer's $V = 0.24$). The difference is found in the conscious thought condition in which participants were more prone to make a choice congruent with their WADD model (Post-hoc analysis of adjusted residuals with Bonferroni correction).

Table 2
Distribution of (in)congruent choices across three experimental conditions

		Experimental condition			
		Automatic	Conscious	Unconscious	Total (% congruency)
Incongruent options	Frequency	19.00	8.00	16.00	43.00
	% experimental condition	45.20	19.00	40.00	34.70
	Adjusted residuals	1.80	-2.60	0.90	
Congruent options	Frequency	23.00	34.00	24.00	81.00
	% experimental condition	54.80	81.00	60.00	65.30
	Adjusted residuals	-1.80	2.60	-0.90	
	Total	42.00	42.00	40.00	124.00

To make choice congruency differences even more clear, the conscious thought condition was analyzed separately (Table 3).

Table 3
Distribution of (in)congruent choices in conscious thought condition

		Chosen option		
		Apartment B	Apartment C	
WADD B	Frequency	14	1	15
	Adjusted residual	4.20	-4.20	
WADD C	Frequency	7	20	27
	Adjusted residual	-4.20	4.20	
	Total	21	21	42

Experiment 2

In Experiment 2, we examined the effect of automatic and unconscious thought processes and activation of conscious thought processes on the feeling of rightness (FOR) for the response given and the tendency to change the initial response.

Based on previous findings (Thompson et al., 2011), we expected (c) that responses in automatic thought condition would generate higher FORs compared to responses in unconscious thought condition and (d) equal increase of FOR after the activation of the conscious thought processes for the automatic and unconscious condition (Simmons & Nelson, 2006).

In addition, based on the findings of Dehghan et al. (2011), we expected (e) that the participants in unconscious thought condition compared to the participants of automatic thought condition will be significantly more inclined to change their final response after the conscious thought activation.

Method

Participants

Forty-nine psychology students (n_f = 40; n_m = 9) aged between 19 and 24 (M = 20.94; SD = 1.39) participated in the second experiment. All participants received course credit for participating in the research.

Stimuli

The experimental stimuli were identical to the first experiment.

Procedure

The procedure was similar to Experiment 1 - participants had to make the same decision (choose the best of 4 apartments). In Experiment 2, there were

only two conditions - automatic and unconscious. After participants made their decisions in the first condition, they all viewed the slide show once again, but this time in a conscious thought condition. This means that they had to look at the same experimental stimuli for another 4 minutes and then answer the question about apartments. This repeated measurement gave them the opportunity to change the initial response. Participants also estimated theirs FOR. This metacognitive judgment was examined twice for everyone – the first time after the initial choice has been made and the second time after participating in a conscious thought condition and making another decision. More precisely, participants were asked to estimate how sure they were of their decision on a scale of 1 to 7 (1 - *I am completely unconfident with my decision*, 7 - *I am completely confident with my decision*). All participants entered their personal code in a survey, which enabled us to pair their answers from two separate measurements.

Design

In Experiment 2, we employed a complex mixed design (2x2) with one between- and one within-subject factor. Participants were randomly assigned into two experimental conditions (25 in automatic and 24 in unconscious condition), and afterwards, all participated in the conscious thought condition.

Power Analysis

Given the scarcity of empirical insights on the effect of conscious thought processes in comparison to the effects of automatic and unconscious processes and the modification of the WADD model in our study, we hypothesized a medium-sized effect of conscious thought process activation on FOR and small to medium-sized effect interaction between experimental conditions and activation of conscious processes. Thus, power analysis indicated that 46 participants would be adequate to detect the medium-sized effect of conscious thought processes and the medium-sized effect of interaction between experimental conditions and conscious thought process activation (Cohen's $f^2 = .25$, $1 - \beta > .90$).

Results

To answer the first (c) and second hypothesis (d) of Experiment 2, we conducted mixed-design ANOVA (2x2). Box's M test has shown the equality of multiple variance-covariance matrices (Box's $M = 4.26$, $p > .10$). Levene's test found homogenous variances of two observed groups ($F(1,47) = 0.21$, $p > .10$). The difference in FOR between automatic and conscious processes groups before the intervention, hypothesized with the first hypothesis, in this statistical model implies the simple effect. Thus, we performed a simple effect analysis

to compare automatic and unconscious groups after the initial decision. Result showed non-significant difference between two experimental conditions ($F(1,47) = 1.35$, $p > .10$). Therefore, the hypothesis was rejected. Participants did not differ significantly in their feeling of rightness before the intervention (activation of conscious thought process), depending on the thought condition they were engaged in (Figure 2, dotted line).

The effect of activation of the conscious thought process on FOR in the utilized ANOVA model implies the main effect of the repeated-measure factor. The effect of the activation of conscious thought processes on the FOR, was statistically significant with a large size effect ($F(1,47) = 43.31$, $p < .001$; $\eta p^2 = 0.48$). FOR was significantly higher in the second measurement after the conscious thought condition ($M = 5.93$, $SD = 0.14$), than before, in the automatic or unconscious condition ($M = 4.95$, $SD = 0.18$). Therefore, we confirmed the second hypothesis (d). Interaction of experimental condition and activation of conscious processes was not statistically significant ($F(1,47) = 0.02$, $p > .10$), implicating that the change in FOR after conscious thought condition (FOR2) was equal among participants previously engaged in automatic and unconscious thought condition.

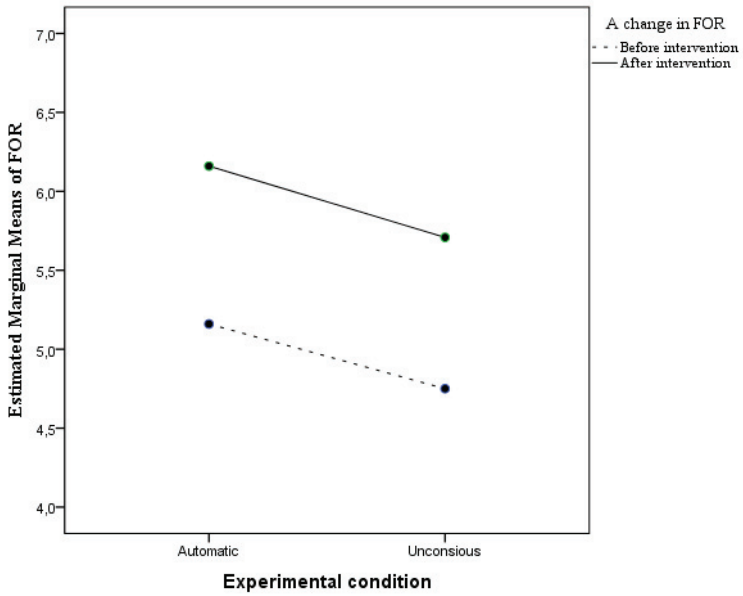

Figure 2. Change in FOR after the activation of conscious thought processes depending on the initial experimental condition.

To test the third hypothesis (e), we created a new variable that shows the tendency to change the initial decision about apartments (values of this vari-

able were: 0 – there was no change; and 1 – the first decision was changed) and performed a chi-square test. The results showed the same tendency to change the initial response after activating conscious thought processes. As shown in Table 4, the majority of participants (81.63%) did not change their response after engaging in conscious thought condition, while the minority of them (18.36%) did.

Table 4
Analysis of the tendency to change initial response in conscious condition depending on the initial experimental condition

		Change of response		
		No change	Another response	Total
Automatic thought condition	Frequency	21	4	25
	% of total participants	42.85	8.15	51
Unconscious thought condition	Frequency	19	5	24
	% of total participants	38.80	10.20	49.00
Total	Frequency	40	9	49

General discussion

The purpose of this research was to examine the effect of automatic, conscious and unconscious thought processes in choosing the subjectively best or the heuristic apartment option, as well as the effect these processes have on the feeling of rightness (FOR) about a decision and the tendency to change it.

Our first experiment managed to clarify its specifics, focusing on the modified WADD model-based decision making. Researchers in this area (Dijksterhuis, 2004; Newell et al., 2009) have not found the benefit of conscious thought in making the best decision, but their experiments did not account for the subjective nature of the decision-making process. However, Payne et al. (2008) have found the superiority of a modified conscious thought condition owing to an unlimited amount of time assigned for the process of decision making. Jekel et al. (2012) claim that WADD model-based decision making leads to better outcomes than heuristic decision making in tasks of probability estimations. Apartment choosing, on the other hand, is a far more subjective decision that requires our attention, time, and deep processing. We expected that participants in conscious thought condition would more often make a decision congruent with their preferences since they would have enough time to become aware of them. With this confirmed, the conscious thought condition

showed a significant degree of congruency between the choice made and the option preferred according to the WADD model, while the same was not true for automatic or unconscious thought condition.

Various research has confirmed the importance of the TTB heuristic in everyday decision making (Bergert & Nosofsky, 2007; Garcia-Retamero & Dhami, 2009; Gigerenzer et al., 1999). It was shown that TTB heuristic decisions had brought the best possible outcome (Gigerenzer et al., 1999) as well as that their benefit depends on the smaller number of attributes and options. By examining the choice congruency (Experiment 1), we can notice that almost one half of our sample has estimated apartment B as their subjectively best option. We can therefore conclude that apartment B was not a proper representation of the TTB heuristic and that we were wrong to consider this option uniquely heuristic for every participant. Since people have different preferences of different magnitudes, a heuristic attribute could be something else for each person. Feasibly, our heuristic features were not of such importance for some participants. Most previous research of the TTB heuristic focused on problems with one specific answer (Bergert & Nosofsky, 2007; Garcia-Retamero & Dhami, 2009), and there is a scarcity of research regarding heuristics affecting subjective, complex decision making. Therefore this construct should be further developed in that direction.

The second experiment examined the role of activated thought processes in the metacognitive estimation of the FOR for the given response. Contrary to our expectations, we did not find the difference between automatic and unconscious thought condition in FOR. Earlier research (Thompson et al., 2011) found that participants often choose a fast, intuitive response and later show high levels of intuitive confidence. Our results can be explained according to Dual-process theory which identifies Type 1 and Type 2 processes (Alter & Oppenhaimer, 2007; Evans & Stanovich, 2013). Perhaps automatic and unconscious thought processes should both be characterized as Type 1 processes since they did not provide sufficient time to facilitate deeper processing. Furthermore, we have found higher estimates of FOR after the conscious thought condition (FOR2) which enabled participants more time to reflect, all in line with previous research (Simmons & Nelson, 2006).

Based on previous research (Dehghan et al., 2011; Dijksterhuis & van Olden, 2006), we expected participants of unconscious thought condition to change their response significantly more often after engaging in conscious thought condition. The difference compared to the initial experimental condition was not found. Since this is the only similar study in the field, the difference in our results could be explained by the fact that participants of Dijksterhuis & van Olden's (2006) research made a decision based on visually presented posters, in contrast with our verbally described apartments. Moreover, their participants were asked for feedback about their choice ten days after, whereas our participants were asked only after a few minutes. Thus, we can argue that choosing an apartment is not that similar to choosing a poster, nor do the following emotional reactions

bear much resemblance. Furthermore, considering that our third hypothesis was rejected and that automatic and unconscious thought processes do not significantly differ in FOR estimates, insinuating that maybe both processes should be considered as Type 1 we can conclude that our participants in both initial conditions were overconfident. Our findings in Experiment 1 clearly showed that subjectively best decisions are more often made in conscious condition compared with automatic and unconscious, so we should still expect to see the change in the decision as well as the change in FOR after engaging in the conscious thought condition in Experiment 2 (Simmons & Nelson, 2006). Since our last hypothesis of the second experiment was not confirmed, we can conclude that overconfidence is not that easy to change when making subjective decisions because one can probably adjust their preferences later in the process to be aligned with the initial decision they were confident about.

Our results show the contribution of the conscious, rational approach to making complex decisions congruent with personal preferences. Other than bringing a contribution to the field of marketing or real estate business, the study's possible implication goes even beyond. Although the two experiments examine decision making in the context of choosing the place of residence, the implications can be easily seen across different areas of human expertise where the rational, attribute weighing approach could be of great value for choosing the best option given. For example, complex decisions are made while buying apartments, cars or pets, while choosing between two jobs or universities as well as when hiring new team members at the company we work for. In each of these situations and many more, we often hear the advice: „Sleep on it and do what feels right.". However, this research clearly supports evidence of rational, engaged decision making being the best approach in choosing an option that is congruent with our preferences and therefore is our subjectively best option. This is especially important if we take into account the results of our second experiment that indicated that we would probably overconfidently stick to our first choices, even if later on we take our time to consciously think it through, which only boosts our prior confidence even more. Hence, we should be cautious and refrain from making rushed or 'slept over' initial decisions because although our first choice may not be the best fitting one, it could easily be hard to overcome, potentially leading us to poor decision making.

Even though this study brought new and interesting insights, future research should try to elaborate on the role of thought processes and metacognition in complex decision-making. New experimental tasks should deploy programming syntax in order to create a TTB heuristic that would be adequate for each participant based on their subjective preferences that should be collected prior to final stimuli exposure and taken into account while creating a heuristic option.

Conflict of interest

We have no conflicts of interest to disclose.

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Appendices

Appendix A: Experimental stimuli used in both Experiments

Apartment A	Apartment B	Apartment C	Apartment D
with a view	without a view	without a view	with a view
high rent	low rent	high rent	low rent
without a built-in wardrobe	with a built-in wardrobe	without a built-in wardrobe	with a built-in wardrobe
high-quality building structure	low-quality building structure	high-quality building structure	low-quality building structure
large apartment	small apartment	large apartment	small apartment
no leisure facilities nearby	leisure facilities nearby	leisure facilities nearby	no leisure facilities nearby
new kitchen	old kitchen	new kitchen	old kitchen
far from public transport	near public transport	near public transport	far from public transport
no noise in surrounding environment	noise in surrounding environment	no noise in surrounding environment	noise in surrounding environment
no fixed wireless internet	fixed wireless internet	no fixed wireless Internet	fixed wireless internet

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ULOGA AUTOMATSKIH, SVJESNIH I NESVJESNIH PROCESA MIŠLJENJA U DONOŠENJU KOMPLEKSNIH ODLUKA

Kompleksne odluke su one koje podrazumijevaju odabir između opcija s više obilježja. Određene odluke donosimo brzo, vođeni automatskim procesima mišljenja, dok druge donosimo pažljivo razmatrajući sve faktore. Cilj ovog istraživanja bio je istražiti ulogu automatskih, svjesnih i nesvjesnih procesa mišljenja u kontekstu donošenja odluka. Sudionici su bili studenti psihologije u dobi između 19 i 28 godina. Prvi eksperiment ispitivao je ulogu ova tri različita procesa mišljenja na odabir subjektivno najbolje opcije i heurističke opcije. Drugi eksperiment ispitivao je metakognitivne aspekte donošenja odluka, konkretno, s ciljem utvrđivanja razlike u metakognitivnoj procjeni sigurnosti u odgovor (eng. feeling of rightness, FOR) kao i tendenciji promjene odluke, ovisno o aktiviranim procesima mišljenja. Različiti procesi mišljenja utjecali su na odabir subjektivno najbolje opcije. Sudionici u uvjetu svjesnog procesa mišljenja češće su odabirali subjektivno najbolju opciju u odnose na sudionike ostala dva uvjeta. Međutim, razlika između uvjeta nije pronađena pri odabiru TTB (eng. take-the-best) heurističke opcije. Nije pronađena razlika između automatskog i nesvjesnog uvjeta s obzirom na metakognitivnu procjenu sigurnosti u odgovor, dok je ista podjednako porasla kod sudionika obaju uvjeta nakon što su naknadno uključeni u uvjet svjesnog mišljenja. Tendencija promjene odgovora nakon uključivanja u svjesni uvjet također nije ovisila o početnom uvjetu. Ovo istraživanje potvrdilo je važnost svjesnih procesa mišljenja u donošenju kompleksnih odluka koje su prisutne u svakodnevnom životu, neovisno o području ljudskog djelovanja.

Ključne riječi: donošenje odluke, svjesni procesi mišljenja, nesvjesni procesi mišljenja, automatski procesi mišljenja, metakognitivna procjena sigurnosti u odgovor

PRIMENJENA PSIHOLOGIJA, 2021, Vol. *14* (1), STR. 53-77

UDK: 316.64 (497.11:497.5)
Research Article
doi: https://doi.org/10.19090/pp.2021.1.53-77

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Received: 21.01.2021.
Correction received: 06.03.2021.
Accepted: 17.03.2021.

ATTITUDES TOWARD EUROPEAN INTEGRATION IN SERBIA AND CROATIA - THE IMPORTANCE OF SOCIODEMOGRAPHIC VARIABLES AND NATIONAL ATTACHMENT

For the past few decades, European integration has been one of the primary issues not just in politics, but also in the social sciences. This issue becomes even more important when research takes place in countries where the population is ambivalent in their support for the EU and European integration. The main aims of the study presented in this paper are to investigate differences in Serbia and Croatia in pro-European orientation and the perception of European integration (EI) as a threat, and to determine the factors underlying both constructs by focusing on sociodemographic variables, the importance of religion, and different forms of national attachment. The results show that citizens of Croatia have a stronger pro-European orientation, while there is no difference in the perception of EI as a threat. Pro-European orientation is determined by the respondents' national identity (in both countries) and gender, the importance of religion, and national pride in the state (only in Serbia). The significant predictors for the perception of EI as a threat were constructive patriotism and national pride in successful individuals (in Serbia), blind patriotism (in Croatia) and the importance of religion (in both countries). The practical importance of the results could be in understanding the obstacles and reservations different people have regarding European integrations.

Key words: Pro-European orientation, European integrations, EU as threat, national identity, attitudes toward Europe

Introduction

Since the first economic integrations in Europe began with the ECSC in the 1950s, researchers from different areas of the social sciences have been questioning how these integrations impact the everyday lives of Europeans. The main idea behind a unified Europe does not necessarily only refer to Europe as one political entity, such as the EU. It also involves cultural unification usually achieved through the use of historical myths such as a common Christian heritage and a common political and legal history (Bryant, 1991). Furthermore, the idea of Europe as a peaceful and democratic project, a manifestation of secular rituals, and the use of common Euro symbols (the flag, anthem, passport format, etc.) promoted a "common cultural identity" (Jacobs & Maier, 1998; Shore, 1995). It was this idea of a common Europe that was often taken for granted (not without merit) by European elites as being strongly supported by European citizens well into the 1970s (Hooghe & Marks, 2008; Ionescu, 1974; Lindberg & Scheingold, 1970). However, after the first referendums on EU membership and the first elections for the European Parliament in 1979, researchers began raising questions concerning citizens' involvement in European integrations, as well as their growing scepticism regarding this topic (Eichenberg & Dalton, 1993; Hobolt, 2009).

What is a "pro-European orientation"?

Although there is some confusion about the definition of a pro-European orientation and similar terms like pro-European feelings (Evans, 2000), EU enlargement support (Karp & Bowler, 2006) and even (reverse) Euroskepticism (Elenbaas & de Vreese, 2008; Hooghe & Marks, 2007), in this paper, pro-European orientation will be used as a synonym for positive attitudes toward European (political and cultural) integration.

First, a considerable part of pro-European orientation in both media and research is linked to support for the EU. As we will try to demonstrate, a pro-European stance—no matter how it is referred to—should not be linked (exclusively) to the support of EU membership as it is also associated with a united Europe in general, which includes political, economic and cultural integration. An even more important question that studies have tried to answer is what determines favorable attitudes toward European integration, i.e., a pro-European orientation? Is this positive attitude toward European integration primarily a result of different national and international economic factors, or are there more specific national and international cultural and historical contexts that influence opinions on the matter? For example, there were clear trends of support for European integrations in different countries pre-Maastricht (Eichenberg & Dalton, 1993) followed by a sharp decline in support

post-Maastricht (Eichenberg & Dalton, 2007; Guinadeau & Schanetterer, 2017; Vries, 2013).

If we consider these results from the perspective of the average EU citizen, there are at least two explanations for why people do (not) support European integration. The first, which was almost uncontested in the 1980s, rested on utilitarian theories based on the premise that citizens evaluate the costs and benefits of integration and, according to the result of this analysis (Anderson & Reichert, 1995; Cram, 2012; Eichenberg & Dalton, 1993; McLaren, 2004), they consequently support integration. These theories also assume that citizens are rational actors and this calculation is based on their knowledge and evaluations (Cinnirela, 1997); therefore an economic crisis in any country, or in the EU itself, would result in a decrease in pro-European orientation (Verhaegen et al., 2014). However, after a sharp decline in pro-European attitudes in the post-Maastricht era, new theories had to be constructed since research showed economic factors could not solely explain the significant drop in support for European integrations since the 1990s (Eichenberg & Dalton, 2007; Vries, 2013).

The second explanation relies on findings showing that the drop in pro-European attitudes in the 1990s was more visible in the decline in support for policy integrations traditionally related to national symbolism, history, culture and national internal affairs such as education, healthcare, social security and cultural policy (Eichenberg & Dalton, 2007). Also, the very fact that the Maastricht Treaty and subsequent treaties were based on political and symbolic factors, rather than economic ones, could have been perceived as a threat to the nation state, and therefore led to more negative attitudes toward European integration (Carey, 2002). However, there is a large body of evidence that European integration can be perceived as a threat not only to national matters, but also to the social security issues, public security (especially in the light of the new wave of terrorist attacks in Western Europe) or even health crises (such as COVID-19 in 2020; Ladi & Tsarouhas, 2020). In the period after the beginning of the migrant crisis in Europe, serious questions were raised about the future of the Schengen regime, because the idea of non-existent borders inside the area proved too challenging for many of the countries, as it was never prepared to deal with the massive influx of refugees at one time (Schimmelfennig, 2018). In the light of the mentioned emerging crises of European integration, we raised, as one of the issues of this paper, the question of whether we can even claim that the same factors (both sociodemographic and psychological) influence pro-European attitudes and the perception of European integration as a threat to national interests (national identity, national security and even economy). Are these just two extremes of the same position, or are they qualitatively different, and are the factors contributing to the perception of European integration as a threat different from those that lead to a decrease in pro-European orientation?

This second wave of theories relies more on affective, cultural, and emotional support in relation to a pro-European orientation (Hooghe & Marks, 2008). Not surprisingly, these studies tend to be more interested in individual determinants of pro-European attitudes; although, these often do overlap with economic factors. For example, in most studies, a more positive stance on European integration is more common among younger, well-educated, urban, highly skilled citizens with higher incomes who are more open to different cultures and have lower "subjective vulnerability" (fear of loss of benefits); in short, groups that can benefit more from integrations (Boomgaarden et al., 2011; Deflem & Pampel, 1996; Perez & Lopes, 2009; Petithomme, 2008).

All of these issues can lead to the conclusion that attitudes toward European integration are rather unstable and can change rather quickly from one study to the next as a result of different political and societal changes, and, possibly, that they are more complex than researchers initially thought. Therefore, it is extremely important to indicate not only the levels of pro-European attitudes in one country, but also the political and social atmosphere (including the existing crisis, both locally and in Europe itself) at the time of the research. Furthermore, fear of European integrations is more pronounced in non-EU countries and new member states, since citizens lack experience with the EU and European integration in general, so the issue of differentiation between pro-European attitudes and fear of European integrations again becomes an important point (Lavine et al., 1998; Vries, 2013).

National attachment and pro-European orientation

One of the main questions in these studies has often been whether national identity and a strong sense of national pride can interfere in the creation of pro-European attitudes, or whether it is possible for these attachments to strengthen a pro-European orientation if they are seen as an integral part of European orientation (e.g., Bruter, 2001; Cinnirela, 1997).

We have already mentioned more recent studies and theories that tend to take into account national politics as being the most important factor for citizens' attitudes toward European integration and claim that citizens (especially in new member states) lack important information about this issue and often rely on national parties, governments, and state policy toward the EU to make up their minds (Boomgaarden et al. 2011; Ray, 2003). National identity can also play important role in the formation of these attitudes, although the results of this relationship are quite ambiguous. In most studies, data show that strong national sentiments do in some instances interfere with pro-European orientation (Azrou, et al., 2011; Carey, 2002; De Vreese & Boomgaarden, 2005; McLaren, 2007), since EU integration and European identity compete with national identity for citizens' group loyalties (Duchesne & Frognier, 2008; Smith, 1992). Also, nationalists (as well as many others) point out that the European

integration project still does not provide the strong sense of security that nation states and national attachment provide to their citizens, and therefore it is not uncommon for people with higher attachment to their nation state (or even to the regions they live in) to be less enthusiastic about and more fearful of European integration (Petithomme, 2008).

However, numerous studies have also shown that citizens with higher national identity tend to be more pro-European if they do not perceive European integration as a threat to their national sentiments (Boomgaarden et al., 2011), or if there is no significant relationship between the two, especially in countries where there is overwhelming support for European integration among the elites (Pérez & Lopez, 2009). Furthermore, another important issue is how national attachment is measured, as different forms of national attachment seem to correlate differently with pro-European orientation. Namely, we can speculate that national identity and national pride are more often indicators of one's attachment to the state, whereas nationalism and patriotism are related more to attachment to one's nationality (ethnic group) and plausibly correlate differently with pro-European orientation.

Pro-European orientation in the Western Balkans

As mentioned before, the research presented in this paper was conducted in Serbia and Croatia, two countries with different paths to EU membership after 2003. So, what is noteworthy concerning pro-European attitudes in Serbia and Croatia? First of all, although Serbia and Croatia share a lot of similarities in their historic development, a common history and, for the majority of the 20th century, culture and political situation for the better part of the 20th century, the period after the 1990s is quite different in these countries. Also, it is, in part, a replication of the study from 2003. when neither of the countries was a member of the EU, or was even close to becoming a member.

After the end of the civil wars in Croatia and Bosnia in 1990s, Croatia almost immediately started its path towards the EU. Granted, the path was slow and consensus did not come easily until 2003, but it was much more goal-oriented than it had been in Serbia in the 1990s. One of the most important mottos of this consensus was that Croatia is Europe, meaning it belonged to Europe much more than to the Balkans, and was more progressive and cultured than the Balkan states were (Bartlett, 2003; *Čehulić* Vukadinović, 2013; Lindstrom, 2003; Subotić, 2011). After eight years of preparation, Croatia was on the threshold of EU membership, and in 2013. it became the newest member state after a 2011. referendum with a very low turnout (only 44% of people from Croatia voted, although, granted, the referendum was non-binding for the government). On the other hand, in Serbia, nationalist parties tend to see European integration as fundamentally in conflict with national interests (Subotić, 2011). Even those who were moderately pro-European (but anti-

EU) often talked about the blackmail and humiliation the EU was subjecting Serbia to in an effort to undermine its national independence (Antonić, 2008). During this time, and certainly before 2012, the European idea was far from universally shared. The first ideas of joining the EU and the first glimpse of pro-European attitudes on a larger scale came after the fall of Slobodan Milošević in 2000. Even afterwards, political opinion on whether EU membership was a positive choice was conflicted; but the majority opinion, and the opinion of the ruling political parties, was that Serbia had "no alternative" to EU membership (Marković-Tomić, 2016). Since 2012, no major political party has based its policies on opposition to the EU, and more focus has been given to the benefits Serbia would have after joining the EU. This is not unusual, since a pro-European stance often means several changes in government and ultimately major splits in the Eurosceptic parties or changes in their political agendas (Konitzer**,** 2011). Contrary to this, in the latest opinion poll in December 2018, only 55% of Serbian citizens voted in support of EU membership, which is one of the lowest levels in the past fifteen years. For example, in 2003, there was a pro-EU majority of 72% that remained consistent until 2009. (European Orientation of the Citizens of Serbia, 2019; Marković-Tomić, 2016). The steady decline in pro-EU (and pro-European) opinion in Serbia over the last decade is sometimes attributed to the "inevitable ambiguous and unclear message on why Serbia should join the EU, and the ever-pending dissolution of the EU" reported on almost daily (BBC World Service Trust, 2010). This is a constant in most EU candidate countries, as big words like "European standard" and "European integration" are not meaningful for the average person and tend to diminish pro-European orientation and/or raise fears about European integration over time (Baltezarević & Baltezarević, 2015).

One of the most prominent distinctions between Croatia and Serbia concerns the predominant religion (Roman Catholicism in Croatia and Orthodoxy in Serbia). Therefore, in this paper, we also deal with the importance of religion for pro-European orientation and the perception of European integration as a threat. Most of the previous studies show that more religious citizens tend to be more Eurosceptic, although this correlation is much weaker in Catholic countries than in Protestant ones (Boomgaarden & Freire, 2009; Guerra, 2013; Nelsen et al., 2001; Scherer, 2015; Young, 1998). But in Orthodox countries, the situation is somewhat ambiguous. Even though pro-European opinion is higher in predominantly Orthodox countries (such as Cyprus, Romania, and Bulgaria) than in Protestant (and to some degree Catholic) countries, the fact remains that these are also some of the newest EU members. The trend of higher optimism for the EU before and just after accession has been well documented (Pettihome, 2008; Scherer, 2015; Tverdova & Anderson, 2004; Vries, 2013). Therefore, religion might in fact not play such an important role in the results. Meanwhile, the Serbian Orthodox Church itself has remained ambivalent towards European integrations. On the one hand, most church scholars do perceive the danger of exclusive viewpoints for society, including Euroscepti-

cism, but on the other hand, they call for caution concerning the "secular" idea of Europe (Bigović, 2010; Krstić, 2015). This leads to an overwhelming opinion in the Serbian public that, similarly to non-Catholic countries in Europe, religious people are more Eurosceptic than non-believers. However, we have no data that support this claim, which is why we have chosen to include the importance of religion as a potential factor in pro-European orientation and the perception of European integration as a threat in Serbia and Croatia.

The present study

The main research question we raise here is: Is there a difference in pro-European orientation and perception of European integration as a threat in Croatia (an EU member state) and Serbia (an EU candidate country)? Second, our aim is to find out how sociodemographic factors (respondents' gender, education, and age), the importance of religion, and different forms of national attachment contribute to the levels of pro-European orientation, with the focus being on national identity, national pride, and patriotism (both blind and constructive). Finally, we want to determine if the same factors contribute to the perception of European integration as a threat, or if these sets of factors are unique for each of the variables used.

Method

Sample and procedure

Our sample consisted of 484 Serbian citizens and 483 Croatian citizens (total $N = 967$) aged 18 to 79, and only the majority ethnic group in both countries was taken into account (i.e., ethnic Serbs from Serbia and ethnic Croats from Croatia). The sample roughly represents the majority in both countries in gender, age and education.

The Serbian participants were aged 18 to 68 ($M = 36.58$, $SD = 12.59$), and 50.40% were women. The Croatian participants were similar in age to the Serbian sample (aged 18 to 79; $M = 38.70$, $SD = 13.89$), and the majority of this sample (59%) were women. About half of the participants in both samples had completed secondary education (55.20% in Serbia, 47.90% in Croatia), and the rest of the sample had completed either primary education (16.90% in Serbia, 19.90% in Croatia) or higher education, including MA and PhD levels (29.70% in Serbia, 32.20% in Croatia). Four age groups were created, comparable to the similar study of European identity in 2003. of which this study is a continuation: 18-25 years (26.90% in Serbia, 22.30% in Croatia), 26-35 years (22.50% in Serbia, 21.70% in Croatia), 36-45 years (23.10% in Serbia, 18.80% in Croatia) and older than 45 years (27.50% in Serbia, 37.30% in Croatia). However, in all of the analysis, age was used as a continuous variable, not as four categories.

The sample was collected during 2016. and 2017. Paper-and-pencil questionnaires were administered individually with all participants.

Measures/Instruments

Subjects filled the questionnaire in their own language (Serbian or Croatian, respectively). Also, all of the scales used in the questionnaire were tested several times in different studies beginning in 2003, either in Serbia or Croatia, or, in most cases, in both countries. However, we have re-tested the factor structure and reliability of all scales for this paper and they proved to be stable in time and in different samples. In the analysis, mean scores for all the instruments have been used.

National Identity Scale (Cinnirella, 1997)

The scale represents a measure of self-assessment, and consists of 7 items. Responses are given on a continuous 5-point scale ending with contrasting categories (e.g., "To *what extent do you feel close to other members of your nation?*") from *not close enough* to *very close*. A higher score indicates a stronger national identity. The scale showed high reliability in both samples (α = .86 in Serbia and .88 in Croatia).

National Pride Scale (adapted from the General Social Survey, 1996)

This scale consists of 10 items (e.g., "*Indicate how proud you are of your country regarding…its political impact in the world?*"). Two factors were extracted describing pride in the state (α = .70 in Serbia and .69 in Croatia; pride in the nation's political influence, social welfare system, democratic achievements, etc.) and pride in the successful individuals of one's nation (α = .62 in Serbia and .68 in Croatia; pride in the nation's achievements in sports, history, art, literature etc.). As these match the theoretical structure, mean scores for both factors were used in the analysis.

Blind and Constructive Patriotism Scale (Schatz, 1995)

This scale measures attachment to the nation (i.e., levels of patriotism). Blind patriotism implies the rejection of any kind of criticism aimed toward one's own people, while constructive patriotism implies openness to criticism of actions conducted on behalf of the nation that respondents consider to be violations of basic national values and long-term interests. The scale consists of 18 items. Examples of blind and constructive patriotism include: "*People who do not support Serbia/Croatia with all their heart should live somewhere else*", and "*We should have complete freedom of speech, even for those who criticize this country*". After excluding three items due to their poor psychometric

characteristics, a two-factor interpretive solution was obtained for both samples that formed blind (α = .82 in Serbia and .83 in Croatia) and constructive patriotism (α = .69 and .75, respectively) subscales.

Pro-European Orientation and Perception of European Integration as a Threat (PEO; Authors, 2007, Appendix A and B)

The Pro-European Orientation Scale (α = .82 in Serbian sample and .78 in Croatian sample) consists of eight items measuring respondents' attitudes toward Europe, the EU and European political, economic, and cultural integration (i.e., "*All citizens of Europe should work on developing a new European culture and way of life*"). The Perception of European Integration (EI) as a Threat Scale (α = .77 in Serbian sample and .72 in Croatian sample) had six items mostly dealing with the potential threat a unified Europe poses to the national interests of the respondent's country (i.e., "*A united Europe is an idea imposed by the few most economically powerful countries in the West*").

The data collected also included several potentially important sociodemographic variables such as gender, age, education, and importance of religion (measured by one item: *"How important is religion in your life?"* on a five points scale).

Results

Pro-European orientation and perception of European integration (EI) as a threat in Croatia and Serbia

The first step in determining differences between respondents from Serbia and Croatia was invariance testing on both constructs. Confirmatory factor analysis and measurement invariance were performed in R packages "semTools" (Jorgensen et al., 2018) and "lavaan" (Rosseel, 2012). Because multivariate kurtosis was violated, robust maximum likelihood estimator (*MLR*) was used. Three levels of measurement invariance were tested: 1) a configural invariance model, in which the number of factors and the items that load on these factors were the same, but factor loadings and intercepts were allowed to vary between groups; 2) a weak or metric invariance model, in which the factor loadings were constrained to be equal between groups; 3) a strong or scalar invariance model, in which factor loadings and intercepts were constrained to be equal between groups, thus enabling mean comparison (e.g., Brown, 2006). Several model fit indices were calculated: χ^2, which should not be significant for good model fit, comparative fit index (*CFI*) and Tucker-Lewis index (*TLI*), with acceptable values above .90, the standardized root mean square residual (*SRMR*), with acceptable values below .08, and the root mean square error of approximation (*RMSEA*), for which acceptable values were below .10 (e.g., Hu

& Bentler, 1999). For nested model comparisons, $\Delta\chi^2$ was used, however this index is sensitive to sample size, therefore other indices were also considered, *ΔCFI* which should be less than .01 with model with higher *CFI* obtained a better fit, and Δ*RMSEA* which should be less than .015, with model with lower RMSEA obtained a better model fit (Chen, 2007). If measurement invariance levels do not differ significantly, we could conclude that a higher level of measurement invariance is achieved.

The results of invariance testing show that Pro-European Orientation (PEO) demonstrated strong scalar measurement invariance with regard to both versions (Table 1). In the case of Perception of EI as a Threat (PET), the results show that weak metric invariance was achieved; however, strong scalar invariance was not achieved. Based on further analysis of items, the results show that partial scalar invariance could be achieved if Item 3 were omitted. With this item omitted, although $\Delta\chi^2$ is still significant ($p < .05$), other indices (Δ*CFI* and Δ*RMSEA*) indicate no significant differences between metric and partial scalar invariance (Table 1). Since mean comparison is needed for testing the hypotheses, we excluded item 3 from the PET from both Serbian and Croatian versions in order to achieve strong scalar invariance.

Table 1
Model fit indices for measurement invariance for Pro-European Orientation (PEO) and Perception of EI as a Threat (PET)

Scale	$\chi^2(df)$	$\Delta\chi^2(\Delta df)$	*CFI*	*ΔCFI*	*TLI*	Robust *RMSEA (90%CI)*	*ΔRMSEA*	*SRMR*
PEO								
configural	78.27(40)***		.92		.89	.08 (.07-.09)		.05
metric	86.74(47)***	5.88(7)	.92	-.001	.91	.08 (.07-.09)	-.004	.05
scalar	175.16(54)***	9.10(7)	.92	.001	.92	.08 (.06-.09)	.005	.05
PET								
configural	36.92(18)**		.99		.98	.04 (.01-.07)		.02
metric	40.87(23)	3.61(5)	.99	-.001	.99	.03 (.00-.06)	.007	.03
scalar	64.68(28)	23.32(5)***	.97	.017	.97	.05 (.03-.07)	-.015	.04
scalar partial	53.77(27)	12.4(4)*	.98	.008	.98	.04 (.02-.06)	-.007	.04

Notes. Scalar partial referred to released item no 3.
*** $p < .001$; ** $p < .01$; * $p < .05$.

Descriptives for variables used are presented in Table 2. Respondents from Croatia have a statistically higher pro-European orientation than respondents from Serbia, although the size of the effect is not very large (t (964) = 2.95, df = 961, p = .003; Cohen's d = 0.19), and there are no significant differences in the levels of perception of EI as a threat between these samples (t (964) = 1.77, df = 961, p = .076; Cohen's d = 0.09).

Table 2
Descriptive indicators for tested variables in Serbia and Croatia

	Serbia				Croatia			
	M	SD	Sk	Ku	M	SD	Sk	Ku
Pro-European orientation	2.61	0.75	-0.03	-0.24	2.75	0.64	-0.03	0.24
Perception of EI as a threat	3.54	0.85	-0.32	-0.48	3.46	0.74	-0.37	0.16
National identity	3.58	0.85	-0.48	-0.41	3.40	0.89	-0.44	-0.57
Blind patriotism	2.47	0.77	0.34	-0.48	2.24	0.77	0.34	-0.49
Constructive patriotism	3.87	0.67	-0.43	-0.03	3.90	0.70	-0.55	0.46
National pride in the state	2.15	0.73	0.96	1.46	2.09	0.71	0.89	1.13
National pride in successful individuals	3.72	0.82	-0.55	0.19	3.59	0.88	-0.59	-0.01

Correlation analyses (Table 3) show that pro-European orientation is negatively related to the importance of religion and positively related to gender in Serbia, as well as to the perception of EI as a threat and national identity in both countries. On the other hand, the perception of EI as a threat is positively related to the importance of religion, national identity, blind and constructive patriotism, as well as national pride in successful individuals in both countries, and to national pride in the state in the Croatian sample. Taking these results into account, as well as the fact that pro-European orientation and the perception of European integration as a threat correlate only moderately, it seems justified to treat these variables separately in further analyses.

Table 3
Intercorrelations of variables in both samples (correlations in the Croatian sample are written in italic)

	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Gender	-.02	-.01	.12**	.13**	-.09	-.04	.02	-.21**	-.02	.01
	*.12**	*.00*	*.09*	*.01*	*.02*	*.05*	*-.00*	*.02*	*-.05*	*.06*
2. Age		.00	.06	.08	.03	.11*	.22**	.20**	.11*	.10*
		.09*	.11*	.02	.13**	.11*	.24**	.18**	.06	.07
3. Education			-.06	-.00	.07	-.04	-.20**	.07	-.10*	.06
			-.11*	.05	-.09	-.18**	-.15**	.03	-.09	.03
4. Importance of religion				-.20**	.16**	.41**	.37**	.01	.18**	.17**
				-.07	.22**	.49**	.45**	.16**	.31**	.33**
5. Pro-European orientation					-.42**	-.17**	-.04	-.06	.04	-.05
					-.41**	-.15**	-.02	.01	.03	-.05
6. Perception of EI as a threat						.18**	.12**	.23**	.04	.18**
						.21**	.23**	.11*	.09*	.12*
7. National identity							.45**	.18**	.32**	.33**
							.50**	.29**	.33**	.45**
8. Blind patriotism								.07	.44**	.17**
								.09	.38**	.26**
9. Constructive patriotism									.02	.19**
									.08	.22**
10. National pride in the state										.34**
										.40**
11. National pride in the successful individuals										

Note. * $p < .05$; ** $p < .01$.

Prediction of attitudes toward European integration

A two-step hierarchical regression analysis was used to determine predictors of Pro-European Orientation and Perception of EI as a Threat. In both analyses, two sets of predictors were used: sociodemographic variables (gender, age, education, importance of religion) in the first step, and different forms of national attachment (national identity, two aspects of patriotism, and two aspects of national pride) in the second step.

Predictors of Pro-European orientation

In the Serbian sample, both tested models are statistically significant ((4, 468) = 9.2, $p < .001$; (9, 463) = 5.07, $p < .001$), and total variance explained is about 9% (percentage of explained variance of both models is given in Table 4). In the Croatian sample, only the second model is significant ((4, 454) = 1.07, $p > .05$; (9, 449) = 1.96, $p < .05$), and total variance explained is lower than in Serbia (about 4%).

As shown in Table 4, pro-European orientation in the Serbian sample (in the final model) is higher in women, older citizens, and individuals who gave lower importance to religion. Out of the different forms of national attachment, only national identity negatively contributes to pro-European orientation, while national pride in the state has a positive relationship to pro-European orientation (although, as Table 3 indicates, this could be a suppressor effect). In the Croatian sample, none of the sociodemographic variables contribute significantly to the prediction of pro-European orientation. Out of the different forms of national attachment, only national identity negatively contributes to pro-European orientation.

Table 4
Hierarchical regression analysis - prediction of pro-European orientation in both samples

		Serbia		Croatia	
Step	Predictors	Model 1 (β)	Model 2 (β)	Model 1 (β)	Model 2 (β)
1	Gender	.16**	.15**	.03	.04
	Age	.10*	.10*	-.00	-.01
	Education	-.03	-.02	.06	.05
	Importance of religion	-.23**	-.20**	-.07	-.02
2	National identity		-.11*		-.20**
	Blind patriotism		.01		.05
	Constructive patriotism		-.02		.07
	National pride in the state		.11*		.08
	National pride in successful individuals		-.02		-.02
		R^2= .07**	Δ R^2 = .02**	R^2 = .01	Δ R^2 = .03*

Note: ** p<.01; * p<.05.

Predictors of Perception of EI as a threat

In the Serbian sample, both tested models are statistically significant ((4, 465) = 5.27, p < .001; (9, 460) = 6.15, p < .001). Total variance explained is 9% (percentage of explained variance of both models is given in table 4). Unlike Pro-European orientation, both tested models in the Croatian sample are statistically significant in this instance ((4, 453) = 8.49, p < .001; (9, 448) = 4.71, p < .001), and total variance explained is higher (7%).

As shown in Table 5, Perception of EI as a Threat (in the final model) is higher in the Serbian sample among individuals who place higher importance on religion. Out of the different forms of national attachment, constructive patriotism and national pride in successful individuals contribute positively to the perception of EI as a threat. In the Croatian sample, the importance of religion is also positively related to the perception of EI as a threat, while out of the different forms of national attachment only blind patriotism contributes positively to the perception of EI as a threat.

Table 5
Hierarchical regression analysis - prediction of Perception of EI as a Threat in both samples

		Serbia		Croatia	
Step	Predictors	Model 1 (β)	Model 2 (β)	Model 1 (β)	Model 2 (β)
1	Gender	-.11*	-.07	-.02	-.01
	Age	.02	-.04	.12**	.09
	Education	.08	.07	-.09	-.07
	Importance of religion	.17**	.12*	.20**	.13*
2	National identity		.05		.04
	Blind patriotism		.08		.11*
	Constructive patriotism		.19**		.05
	National pride in the state		- .07		-.03
	National pride in the successful individuals		.12*		.02
		= .04**	Δ= .06**	= .07**	Δ= .02

Note: ** p<.01, * p<.05

Discussion

Before we discuss the results, we will look back on the relation between our two main concepts. Although we cannot offer a definitive answer to the question of whether pro-European orientation and the perception of European integration as a threat are two opposite poles of one dimension, we are not inclined to support this. First of all, the correlation between the two is rather low (just above .40 in both countries). Furthermore, there are obvious differences in the predictors of both variables, therefore, it is highly likely that the two are different (although related) qualities of the attitudes toward Europe and its integration. Lastly, the items in both scales show that Pro-European orientation is more cognitive (rational?) than the Perception of EI as a threat. Concerning the latter, fear, or at least reservation toward European integration

is much more distinctive, pointing us to the conclusion that these two concepts rely on different psychological factors.

The results show that pro-European orientation is higher in Croatia than in Serbia. Although this may not seem surprising at first, it is important to note that this is in complete opposition to findings from the research in 2003. (Kamenov et al., 2006). It is also in contrast to the usual result that citizens of EU candidate countries tend to have more positive attitudes toward Europe and European integration (Pettihome, 2008; Scherer, 2015; Tverdova & Anderson, 2004; Vries, 2013). However, we must take into account that in 2003, Croatia's political parties were just arriving at a consensus on Croatia's European future, and that it was also a tumultuous year for many issues in Serbia, as it was the year that a pro-European stance in Serbia was at an all-time high. On the other hand, after 2003, Croatia's elites were very keen on promoting membership in the EU, and this eventually resulted in its accession in 2013. Thus, it was not unexpected that pro-European attitudes would drop significantly in Serbia. This study demonstrates that pro-European orientation is now higher in Croatia, which is a young EU member state, and had been a member only for three years at the time the study was conducted.

One possible explanation for the finding that there is no difference between Serbia and Croatia in the perception of EI as threat might be that this perception is rather high in both countries, and that both countries are among the member states (or member candidate states) that tend to have more economic and internal political challenges than countries in Western Europe. This is not uncommon in smaller and less economically stable countries in which citizens are more fearful of a European future and what European integrations will bring to their country and to them personally (Boomgaarden et al., 2011; Deflem & Pampel, 1996; Perez & Lopez, 2009; Petithomme, 2008).

As for the factors that contribute to pro-European orientation and the perception of EI as a threat, it is clear that the variables chosen here are better predictors of the latter. Furthermore, we can see that there are differences in the predictive models of both pro-European orientation and the perception of EI as a threat in Serbia and Croatia. However, in both models and countries, the percentage of variance explained is rather low, indicating that there are other important variables not used in these models. We could speculate that variables more directly linked to European attitudes would be better predictors of pro-European orientation and the perception of EI as a threat (such as European identity). Furthermore, a low standard deviation in both samples suggests there is a considerable consensus on the European future of both Serbia and Croatia, regardless of background and national attachment.

In terms of pro-European orientation, it is noteworthy that none of the sociodemographic variables are significant predictors in Croatia (which is in line with other studies that show that when national consensus has been achieved, a pro-European agenda is shared by most groups in the country (Boomgaarden et al., 2011; Pérez & Lopez, 2009; Subotić, 2011), while age, gender, and the

importance of religion are significant in the model in Serbia (older citizens, women, and those who find religion less important tend to have a stronger pro-European orientation). If we take only Serbia into account, the result that women have more a pronounced pro-European orientation has also been found in other studies (i.e., Boomgaarden et al., 2011; Vries, 2013), although it is not a constant (i.e., Damjanovski et al., 2020; Nelsen & Guth, 2000). Regarding age, older respondents tend to have more positive pro-European attitudes, which is in contrast with some recent studies that show higher Euroscepticism among older respondents (Damjanovski et al., 2020). However, as we argued at the beginning of this paper, low Euroscepticism is not a synonym for Pro European orientation (or, rather, Anti-European orientation), but rather a mixture of PEO and fear of European integrations, based on challenges for the individual, but also for the national identity and economy. Although this result is different in our study, age was not among the most important predictors of either Euroscepticism (Damjanovski et al., 2020) or PEO (in our study). One of the more interesting findings is the negative relationship between the importance of religion and a pro-European orientation in Serbia, but not in Croatia. Research shows that non-Catholic countries tend to have more negative attitudes toward European integration (Boomgaarden & Freire, 2009; Guerra, 2013; Nelsen et al., 2001; Scherer, 2015), and since Orthodox churches maintain a somewhat ambivalent position toward Europe and its supposed secularism (Bigović, 2010; Krstić, 2015), this result is well in line with expectations. Therefore, it appears that the deciding variable here is not so much an importance of religion, but rather importance of the specific religion. There are only four predominantly Orthodox countries in the EU, and only one (Greece) joined before 2004. As for the member-candidate states in the Western Balkans, it is clear that Orthodox countries tend to be more Eurosceptic than those with a higher number of Muslim citizens (Damjanovski et al., 2020). The solution to this issue could lie in sharing the experience of EU Orthodox countries and their role in the EU. This could lower the reservation Orthodox believers have toward integration that, still, favours economically stronger nations which are, Protestant or, in rare cases, Catholic.

The second set of variables show that a strong national identity interferes with pro-European orientation in both countries, while pride in the state's achievements contributes positively to it (although significantly only in Serbia). According to the results of the correlation analysis, the correlations between national identity and other forms of national attachments are high. This could explain why all other measures of national attachment failed to reach the level of significance in this analysis, and it is not uncommon for strong national identity not to interfere with pro-European attitudes (Azrou et al., 2011; Carey, 2002; De Vreese & Boomgaarden, 2005; McLaren, 2007). Although the finding that people who have more pride in the state are also more pro-European may at first seem counterintuitive, the answer lies in the scale itself. The National Pride Scale measures pride in the areas that are the core principles Europe is

based on (social welfare, democratic institutions, equality, etc.). Therefore, it is not unexpected that people who are proud of Serbia's achievement in the aforementioned areas would perceive European integration as a means for Serbia's validation by other European nations. We would like to reiterate that we do not consider these two to be in any kind of opposition; higher national sentiments do not necessarily mean lower pro-European stance (as was partly the case in this study). But, most nationalistic parties in almost all European countries (and people) tend to place national identity and pro-European orientation in opposition, and it is vital that policy makers (both in Europe and in the EU and EU member countries) focus more on reassuring citizens that national identities will not be threatened in any way by the integration of assets and culture in Europe. It seems people still struggle with this notion and many of them oppose European integrations on the basis of endangerment of their national sentiments.

Predictors of the perception of EI as a threat are somewhat different from predictors of pro-European orientation, which indicates that these are not simply two extremes of the same attitude, but instead two qualitatively different aspects of a particular stance on European integration. In both countries, the importance of religion was one of the most significant (in Croatia it was the most significant) predictors of the perception of EI as a threat, which demonstrates that more religious people do not necessarily have an anti-European orientation but do feel more threatened by European integration. They most likely acknowledge that integration is more focused on economic and cultural issues, in which religious, or at least Christian, matters are often perceived as burdensome for European religious diversity. It is interesting to point out that, unlike pro-European orientation, believers of both Christian denominations in these countries share concerns over the role of religion in general in secular institutions like the European Union. A guarantee that the Christian heritage of Europe would be preserved could provide the answer, but could also increase fears of integration in non-Christian countries of Europe, many of which are on their road to the EU.

As for national attachment scales, patriotism proved its predictive strength. Blind patriotism is, in fact, very close to nationalism, and therefore it could be expected that those who are more nationalist, even in EU countries (or more precisely, especially in the smaller EU countries) tend to perceive European integration as a threat to their country due to fears of what place their country would be relegated to in such a large community. In Serbia, the reason why this kind of patriotism is not relevant potentially lies in the fact that Serbia is far from its place in the EU, so the nationalists need not use fear as a means of creating opposition to European integration, but rather some other, more tangible factors. Perhaps more interesting is the result that people who has higher constructive patriotism in Serbia tends to be more fearful of Serbia's future in a united Europe. The reason for this probably lays in the fact that people with more realistic perceptions of Serbia's problems, and who are

more critical of its internal accomplishments, fear European integration because it will impose demands and requirements that Serbia is still not ready for. This is why, in terms of constructive patriotism, the more patriotic people are, the more they tend to be more fearful of the requirements European integrations impose on Serbia. This concern could be used for good, if politicians in member-country states become more open to the ideas and suggestions of those whose patriotism lies in the desire to assist their country's path to the new Europe, rather than those whose unreasonable fear for the nation could hinder integration.

At the end, we can conclude that pro-European orientation is somewhat higher in the EU member state than in the candidate state (at least in the SEE region). Furthermore, there seems to be no difference between new member states and candidate member states in terms of the perception of European integration as a threat; however, further research is needed to see if the same holds true in contexts outside of the Western Balkan states. It could be especially valuable to evaluate this result in other countries in Europe that share a similar history and/or culture, but are in different places on their EU membership roads (i.e., Ukraine and the Baltic states or Turkey and Bosnia and Herzegovina). It also appears that strong national attachment is more likely to interfere with pro-European orientation, and contribute to the perception of integrations as a threat. Finally, in both countries, strong religious feelings play an important part in the perception of EI as threat, but the predominant religion in the country is important only regarding pro-European orientation. Lastly, pride in the achievements of one's nation can also be a contributing factor to a pro-European orientation (if the pride is derived from similarities with the "European way of life") or for the perception of EI as threat, if this pride arises from achievements more likely to be overlooked within the greater European community. However, given all the above, we expect that in Serbia these differences will decrease as it draws nearer to EU membership, and also when political, cultural, and clerical elites come closer to achieving a consensus on the country's European future, as was the case in Croatia almost twenty years ago.

Authors' note

All ideas and results in the paper contain original empirical work done by the authors and their respective teams in Serbia and Croatia. The research meets all APA ethical standards. The data have been analyzed in the IBM SPSS23 software. Both authors` institutions have appropriate licenses for the software.

A Part of the data presented in this paper has been presented at the conference (Bodroža, B., Jelić, D., Mihić V., Jelić, M. & Kamenov, Ž. (2017). Pro-European orientation in Serbia and Croatia: Contribution of socio-demographic

characteristics, national attachment, European identity and perception of EU as a threat. Oral presentation on *23. Dani Ramira i Zorana Bujasa* (6-8.4.2017., Zagreb, Croatia). Book of abstracts, pp. 80.)

Acknowledgement

We are deeply grateful to Bojana Dinić, associate professor at the Department of Psychology, Faculty of Philosophy, University of Novi Sad for her enormous help and insights in statistical analysis for this paper.

Funding

This work was supported by the Serbian Ministry of Education, Science and Technological Development and Croatian Ministry of Science and Education. The funding institutions had no role in study design.

Conflict of interest

We have no conflicts of interest to disclose.

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Appendices

Appendix A: Pro-European Orientation scale

1. Our future lies solely in a unified Europe.
2. The identity of a European is worth giving up a part of our national identity for.
3. I support merging the cultural values of European nations and the creation of the new European way of life.
4. I consider myself first of all European, and then a member of my nation.
5. The creation of one European nation is the goal we should strive for.
6. The creation of the EU represents the path leading all European nations into a brighter future.
7. All citizens of Europe should strive to develop a new European culture and way of life.
8. Only merging human and financial resources on the European continent can create conditions for a better life.

Appendix B: Perception of European Integration as a Threat scale

1. European soil is so versatile that the idea of the European nation is pure utopia.
2. A unified Europe is an idea imposed by the few economical super-powers of the West.
3. The creation of the EU brings great harm to the national interests of the smaller countries.
4. People from different nations cannot achieve the unity that can be found in members of the same nation.
5. The creation of the EU leads to the inevitable domination of the larger European nations over the smaller ones.
6. The trend of world integration is in the interest of the big capital more than it can contribute to the better life of the ordinary people.

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STAVOVI KA EVROPSKIM INTEGRACIJAMA U SRBIJI I HRVATSKOJ - ZNAČAJ SOCIODEMOGRAFSKIH VARIJABLI I NACIONALNOG IDENTITETA

U proteklih par decenija, evropske integracije bile su jedan od najčešće istraživanih konstrukata u političkim, ali i u drugim društvenim naukama. Ova istraživanju su još važnija kada se sprovode u zemljama u kojima su građani ambivalentni u svojoj podršci EU i evropskim integracijama. Osnovni ciljevi ovog rada bili su istraživanje razlika između stanovnika Srbije i Hrvatske u proevropskoj orijentaciji i percepciji evropske integracije kao pretnje, kao i da se utvrde prediktori oba konstrukta, sa fokusom na sociodemografske varijable, važnost religije i različite forme nacionalne vezanosti. Rezultati pokazuju da stanovnici Hrvatske imaju snažniju proevropsku orijentaciju, kao i da nije bilo razlika u percepciji EI kao pretnje. Prediktori proevropske orijentacije bili su nacionalni identitet (u obe zemlje) kao i pol, važnost religije i nacionalni ponos državom (samo u Srbiji). Značajni prediktori percepcije EI kao pretnje bili su konstruktivni patriotizam i nacionalni ponos uspešnim pojedincima (u Srbiji), slepi patriotizam (u Hrvatskoj), kao i važnost religije (u obe zemlje). Praktični značaj ovih rezultata ogleda se u razumevanju prepreka i rezervisanosti građana prema evropskim integracijama.

Ključne reči: proevropska orijentacija, evropske integracije, EU kao pretnja, nacionalni identitet, stavovi prema Evropi

PRIMENJENA PSIHOLOGIJA, 2021, Vol. *14* (1), STR. 79-101

UDK: 159.922.72-051.4
Research Article
doi: https://doi.org/10.19090/pp.2021.1.79-101

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Received: 18.01.2021.
Correction received: 04.03.2021.
Accepted: 12.03.2021.

TRUST ME, I AM LYING TO YOU*: CHILDREN'S ABILITY TO GIVE FALSE STATEMENTS AND ITS CORRELATES

Lying emerges early during preschool age. The focus of previous research has been mainly related to the ability to lie in preschool children. In this research, which uses a new procedure to lie, the aim was to examine the ability to make a false statement in school-age children, as well as the cognitive and social correlates of children's success in making a fabricated narrative. A total of 48 children, 16 children in each studied grade of elementary school (first, fifth and eighth), had the task to construct false autobiographic narratives and report them as convincingly as possible in order to convince others that it really happened to them. The persuasiveness of their video-recorded narratives was assessed by 15 independent observers. Using a specially constructed inventory, assessments of the intelligence, verbal ability, peer group popularity, and antisocial behavior of each child were collected from the class teachers. The results show that children aged 10 to 11 years and children aged 13 to 14 years were assessed as more convincing compared to younger children aged 6 to 7 years. However, there was no difference in the ability to make a fabricated narrative between children aged 10 to 11 and children aged 13 to 14, nor a difference in this ability between girls and boys. Children with higher school achievement and those who were assessed by the class teacher as more intelligent, verbally capable, and more popular among peers were also assessed as more convincing by the group of independent assessors while reporting false autobiographic narratives.

Keywords: cognitive development, deception, intelligence, fabricated narrative, peer group popularity

* Words addressed to the researcher during participation in the research (girl, 7 years old)

Introduction

The importance of lying for human functioning is best illustrated by the fact that it occurs very early, in children as young as around the age of three (Evans & Lee, 2013; Wilson et al., 2003). Most research on the topic of lying in children studied the children's concept of lying and their moral evaluations of acts of lying (Talwar et al., 2002; Talwar et al., 2004; Talwar & Lee, 2008a). Less attention has been dedicated to children's ability to lie, that is, examining their success in deceiving others (Talwar & Lee, 2002). The ability to lie represents the ability to successfully verbally deceive another person that is to convince the other person that a false statement is true. For a child to be successful at lying and to avoid getting "caught" in a lie, they first need to learn to construct a false statement, and then to also (a) monitor their verbal production in order to ensure the consistency between the initial false statement and the subsequent statements – any type of inconsistency in reporting can lead to getting "caught" lying, and (b) control their nonverbal behavior (Talwar & Lee, 2002). It has been shown that younger children have more difficulty in maintaining consistency when reporting false statements and that they are more likely to "reveal" themselves by "slipping out" a piece of information that contradicts their lie (Lee & Talwar, 2002; Talwar et al., 2007). The ability to elaborate when lying and to maintain consistency when giving false statements increases in children with age, especially after the age of six (Talwar & Lee, 2008b).

In the examination of lying in children, the most frequently used approach is the so-called temptation resistance paradigm – children are instructed not to turn towards a toy placed behind them or not to play with it while the researcher is not in the room. Research findings show that most children of different ages do not follow the instructions and later give a false statement about what they did (e.g., Evans & Lee, 2013; Talwar et al., 2007; Talwar & Lee, 2011; Williams et al., 2013). Within the given paradigm, the ability to maintain consistency of reporting is examined through additional questions, such as stating the identity of the toy when the researcher clearly emphasizes that the child must not see the toy. Children who lie successfully are able to avoid this question or to provide false information about the identity in order to conceal their transgression. Children who are unable to maintain consistency reveal the identity of the toy even though they previously denied seeing the toy. The advantage of this paradigm is that it represents a realistic situation in which children are essentially motivated to lie in order to conceal that they did something wrong, similar to everyday situations in the children's family environment. The problem is that this procedure asks children to provide only short, simple answers (Talwar & Lee, 2002), which do not require further elaborating the lie, and also that the procedure is not applicable to older children for testing the ability to maintain consistency while giving false statements. Due to the stated shortcomings of this paradigm, in this study, the ability to give false statements is operationalized through the child's degree of persuasiveness when reporting

stories about false autobiographic events that is things that never happened to the child (Milosavljević et al., 2016). Fulfilling this task requires two types of ability in the child, both necessary for successful lying: (a) the ability to devise rich, coherent, and plausible contents of the story in a short period of time, and (b) the ability to present that content as convincingly as possible in order to deceive others that the given event actually happened. The procedure consists of the following steps: the children are instructed to give only false statements, that is to devise and present as convincingly as possible a predetermined event that did not happen to them as if it did, after which a group of independent assessors uses several assessment states to evaluate the persuasiveness of their reports. The assessors are told that some of the stories are authentic, and some are not, which ensures greater dispersion of evaluations and a higher validity of the assessment, because in everyday situations we assess the credibility of the statements of others without knowing whether they are telling the truth or not.

Although lying in children has been recognized as one of the problems in their communication with parents and teachers, the leading authors in this field, Talwar and Lee (2008a), state that the cognitive and social correlates of children's ability to lie successfully are underresearched.

Correlates of children's ability to lie

Cognitive development and the ability to lie

The success of lying is connected with the age of the child. It has been shown that although younger children lie more often, older children lie more successfully (Feldman et al., 1999; Talwar et al., 2006; Evans & Lee, 2011). Based on the reports of teachers and parents, it can be seen that lying is typical for ages 6 to 8 and that around the age of seven it becomes a persistent form of behavior (Gervais et al., 2000). It has been shown that as the children's cognitive abilities mature, the probability that they will use lies increases, and also that sophistication and persuasiveness of their lying increases with age (Evans & Lee, 2013; Lee, 2013). Contrary to only a few three-year-olds, as many as half of four-year-olds and most five-year-olds have used some kind of strategy to avoid getting caught in a lie. With age comes the development of cognitive functions in children, and thus the ability to lie is also developed, which is expressed through the sophistication of lying (Lee, 2013; Talwar et al., 2006). The ability to deceive is considered one of the significant indicators of cognitive maturity (Talwar & Crossman, 2011). The ability to mentalize is also another cognitive component important for the ability to lie (Frith, 2012). Research findings also show a connection between executive functions and success in lying (Talwar & Lee, 2008a). Children who are more successful in lying achieve better results in verbal tests of working memory, which suggests that verbal working memory is important for processing and manipulating in-

formation during lying (Alloway et al., 2015). Considering the stated findings, that children with more developed executive functions and a higher working memory capacity, which are abilities that can be considered indicators of general intelligence, are more successful in processing and manipulating information when lying, it can be expected that there is a positive correlation between the ability to give false statements and the assessments of general intelligence and the verbal ability of children by teachers.

Gender and the ability to lie

When it comes to the differences between girls and boys, parents, as well as teachers, report that boys lie more often than girls, which some authors associate with behavior problems which are more frequent in boys (Gervais et al., 2000). However, findings on the differences in the ability to lie between boys and girls are inconsistent. In research by Feldman and colleagues (1999), observers assessed whether a child is lying or telling the truth based only on nonverbal behavior, and differences in the successfulness of lying were registered in favor of the girls, but only at younger ages. Talwar and colleagues (2006) simulated children's testimony in court. Parents taught the children what to say and practices with them three times a day. Recordings of the testimonies were used to assess the persuasiveness, and it was shown that the false testimonies of girls were assessed as more convincing when compared to the false testimonies of boys. In line with the given findings, it is assumed that on average the false statements of girls will be assessed as more convincing when lying, compared to the statements of boys, and that this difference will be greater at younger ages.

Peer popularity and the ability to lie

Social factors are also presented as significant correlates of the ability to lie. Feldman and colleagues (1999) divided adolescents into groups of those with more or less developed social skills based on the assessments of their parents and then instructed them to give false and true statements about their enjoyment of certain drinks. It was shown, especially in younger ages (11 to 13, in comparison to 14 to 16 years), that adolescents with more developed social skills are on average more successful in lying when compared to those who are less socially competent. The authors explain these results with the fact that socially competent people are more expressive, better at controlling emotions, and more successful in nonverbal communication, which is very important when the goal is to report false content as convincingly as possible in order to deceive others that it is true. Since people with more developed social skills are more popular and dominant in their social interactions (Ambady & Rosenthal, 1998), a positive correlation between a child's popularity (likability) in their peer group and their successfulness in giving false statements can be expected.

Antisocial behavior and the ability to lie

Lying is considered one of the early indicators of later behavioral problems. Research findings show that preschool and older children who lie frequently are more likely to manifest behavioral problems (Stouthamer-Loeber, 1986; Stouthamer-Loeber & Loeber, 1986; Wilson & Carroll, 1991). In a study examining boys of different ages (fourth, seventh and tenth grade), it was shown that lying is related to delinquency, aggressiveness, and behavioral disorders, and also that the correlations between lying and antisocial behavior are more intense in older children (Stouthamer-Loeber & Loeber, 1986). Children who have been punished more in school are more likely to resort to lying in order to cover up their wrongdoings, and they are more successful in lying (Talwar & Lee, 2011). It can be assumed that antisocial behavior will have a positive correlation to the children's ability to give false statements, i.e., children with more pronounced antisocial behavior will be more successful in giving false statements.

The present study

Children's giving of false statements is a very important topic, especially for the field of forensics and children's testimony in court (Talwar & Crossman, 2011). This study aimed to examine the ability to give false statements in children of different ages, as well as the social and cognitive factors based on which children may be distinguished in terms of their ability to make and present false autobiographical narratives. Applying a new procedure for measuring this ability among both younger and older children, in the same way, enables comparing this ability at different ages. To the best of our knowledge, this ability has not been examined on a sample of children within the Serbian-speaking area. Based on the results of previous research on the correlates of the ability to lie or give a false statement, it was expected that children's intelligence, verbal ability, popularity among peers, and antisocial behavior, as assessed by their teachers, would be positively correlated with their ability to make and present false autobiographical narratives.

Method

Pilot Study

The pilot research was conducted in order to adjust the procedure for examining the ability to give false testimony in children and to select the most appropriate events for the main study. The convenience sample consisted of six children (two boys and four girls) 7 to 12 years old. Researchers initially constructed ten events based on which children should make up their narratives.

The events are designed to be (a) poorly structured, without too many details, in order to provide the children enough opportunity to make up a unique story, (b) descriptions of something that could have happened to both younger and older children, and (c) describable using terminology comprehensive to both younger and older children. The children were instructed to devise and present a story about the given event as convincingly as possible in order to deceive others that it really happened to them. The children's false statements were recorded using a video camera. Based on the researchers' observations and data collected through a semi-structured interview with the children, it was determined that some events had been experienced by most children and those events were not included in the main study. Out of remaining seven events, three were selected to be used in the main study, and four events were selected as replacements – if the child reports that they experienced any of the three initially selected events, a replacement should be given. The list of the selected events is presented in Appendix A. In addition, conducting the pilot study showed that, when this procedure is applied to children, it is necessary to explain the task more than once and in more detail, to emphasize that children do not have to speak until the time is up, but only until they finish the story they started, and to not maintain direct eye contact with them while they are speaking. The instructions for children, modified after the pilot study, are presented in Appendix B.

Main study

Participants

Children as narrators. The sample of children consisted of 48 pupils in the first, fifth and eighth grades (16 each), balanced by gender. The children were recruited from two elementary schools in the Republic of Serbia (elementary school „Kralj Petar II Karađorđević" in Belgrade and elementary school „Sveti Sava" in Velika Plana). Before the start of the research, the school principal›s consent, classroom teacher's consent, parent's consent, and the children's own verbal consent were collected. The children who did not voluntarily apply to participate did not participate at all, regardless of whether their parents signed informed consent. The children's identities were protected by data obfuscation. The researchers were very careful while working with the children, especially the younger ones. The term *lying* was not used in order to avoid the possibility of encouraging lying or other possible negative consequences of participating in the research. The children were told that the researchers were examining who could come up with and tell a better, more convincing story so as to convince others that it had actually happened.

Teachers as assessors of children's characteristics. Teachers also took part in the study by assessing the degree to which specific characteristics of

the child are expressed. The selection criteria for the teachers were a minimum of five years of experience working with children and teaching at least three classes a week to the child whose characteristics they assessed. It was important that the teachers have frequent interaction with the child in order to avoid having them assess the characteristics of children they do not know well enough, which would reduce the validity of their assessments. The sample of teachers consisted of three female teachers, one for each grade. All the teachers volunteered to participate in the study.

Students as assessors of the ability to give a false statement. The persuasiveness of the children's false narratives was assessed by 15 students, both male and female, who volunteered to participate in the research. All the students were currently pursuing an undergraduate or a master's degree in psychology at the Faculty of Philosophy, University of Belgrade. All the students denied having previous experience in lying assessment or attending any deception detection training.

Variables and instruments

Variables. *Children's age* with three categories: 6 to 7 years old, 10 to 11 years old, and 13 to 14 years old. *Children's gender* with two categories: male and female. There were 8 boys and 8 girls in each age category included in the research. Data on *school achievement* (average grade for the semester) was also collected for each student. School achievement is assessed qualitatively for the first-graders, so teachers were instructed to assess their school achievement numerically, assigning them the average grade that they would have if their achievement were numerically assessed.

Assessment inventory for teachers. In addition to the aforementioned measures, the teachers' assessments of the intelligence, verbal ability, popularity, and antisocial behavior of the children were also collected. An assessment inventory for teachers was created for the purposes of this study. In the first phase of inventory construction, definitions of the assessed characteristics were created based on a review of the literature about general intelligence (e.g., Legg & Hutter, 2007; Trebješanin & Lalović, 2007), verbal ability (e.g., Hunt et al., 1975), peer popularity (e.g., Ledingham et al., 1982) and antisocial behavior (e.g., Shinn et al., 1987). We have defined intelligence as the ability to quickly and successfully cope with new situations, i.e., solving problems by recognizing important relationships in the problem situation (ability to learn, remember and think). We have defined verbal ability as the ability to understand and shape verbal content, as well as to discover the relations between concepts given in the verbal form. We defined popularity as the level of likability among peers, as well as the ability to successfully establish and maintain positive and friendly peer relationships. We defined antisocial behavior as the level of the tendency to violate certain rules of behavior as well as to physically, verbally or emotionally hurt another person. In the second phase, each construct was,

based on the definition, operationalized using three indicators: intelligence – the ability to reason, academic efficiency and the ability to acquire information in teaching; verbal ability – clarity of expression, vocabulary and verbal fluency; popularity – likability among peers, a peer group role model, and social domination; antisocial behavior – physical aggression, verbal aggression, and lack of discipline. In the third phase, each of the twelve indicators was formulated in the form of an item. In the fourth phase, researchers asked two teachers employed in primary schools, who did not participate in the study, to read the items and highlight possible ambiguities. Finally, an assessment inventory was constructed for teachers to assess the level of expression of each of the four assessed characteristics. Teachers assessed the children's characteristics across 12 scales in total, using 7-point Likert-type scales (1 – *does not apply to this child at all* to 7 – *fully applies to this child*) (Appendix C). The score was calculated by summing the scores to three items that describe the specific characteristic.

Scales for assessing the ability to make false statements in children. Research shows that lies and truth can be discerned better if they are assessed using indirect measures such as persuasiveness, coherence, number of details in statements, etc. (Granhag et al., 2015; Vrij et al., 2000). Therefore, the ability to give false statements is operationalized through the child's persuasiveness in giving false statements – psychology students assessed the extent to which they were convinced that the given event really happened to the child. In addition to the general scale of the child's persuasiveness, the assessors also assessed the richness of the story details (to what extent is the story rich in details), the persuasiveness of the story content (to what extent is the story content persuasive), the persuasiveness of nonverbal behavior (to what extent is nonverbal behavior such as facial expression and body language consistent with the content of the story) and level of anxiety (how upset is the child). These criteria were chosen because it was shown that, in relation to false statements, true statements contain more details, and the content itself is more realistic, coherent and more plausible (Vrij, 2008). On the other hand, when a person gives a false statement, the nonverbal behavior is less consistent with the content of the statement and a greater level of anxiety may be observed because of the fear that the person will fail to convince others that what they are saying is true (Ekman, 1992). In this research, it can be expected that children who are less successful in giving false statements will show more signs of anxiety because the task itself will be cognitively more difficult, and there will be a greater fear that they will not be able to convince others that the event really happened. Assessors rated aforementioned indicators of children's persuasiveness in giving false statements using 7-point Likert-type scales (1 – *not at all* to 7 – *very much*).

Procedure

Giving false statements. The process of giving false statements was video recorded. Children were seen individually in a quiet room in their school. The video camera was placed in front of the children in order to record the whole figure of the child, both facial expressions and body movements. Three cards describing events that had never happened to them were given to the children to read on their own or to be read to them by the researcher. If the child reported that any given event had happened to them, they were given one of the replacement events. The child was required to construct and tell a story about the given event as convincingly as possible. They had one minute to devise the content of the story and a maximum of two minutes to tell their stories as convincingly as possible. It is important to emphasize that the children were told to tell the event convincingly "as if it had really happened to them, as convincingly as possible, so as to convince the researcher that it had really happened to them." Also, the children were told that students would evaluate the credibility of their storytelling. The instruction was composed so as to additionally motivate the children to try to devise a false autobiographical narrative in the best possible way and to tell it as convincingly as possible so that the measured individual differences in making and giving false narratives would be a consequence of differences in the children's abilities, but not the differences in the children's motivation (Appendix B). The order in which the stories were given to the children was balanced in accordance with the rule of the Latin square to avoid the effect of the order. The names of all videos were obfuscated to ensure the anonymity of the data.

Assessment of children's characteristics. After the phase in which the video recordings were made, the teachers' assessments of the intelligence, verbal ability, popularity, and antisocial behavior of the children were collected, as well as their average grade of school achievement in the last semester. The assessment inventories of the teachers were also obfuscated so that no one could link the assessed characteristics of the children with their identities.

Assessment of children's ability to give false statements. In order to obtain greater objectivity in assessing the persuasiveness of the children in giving false statements, 15 students independently evaluated the children's false narratives by watching the recorded videos. Each student evaluated a total of 144 videos (three stories for each of the 48 children). In order to ensure greater dispersion and validity of assessments, the students were told that some of the stories were authentic and some were not because in everyday situations we assess the credibility of the statements of others without knowing whether they are telling the truth or not. The order of the recordings was randomized for each student to avoid the effect of order and to ensure that each video was independently assessed. After watching the recording, the students assessed each false statement story on five 7-point Likert-type scales.

This study has been reviewed and approved by the Institutional Review Board of the Department of Psychology, Faculty of Philosophy, University of Belgrade, Serbia (Protocol #2021-10).

Results

The ability to give false statements

A total of 15 independent assessors used five different scales to assess 144 video recordings, thus generating 10,800 assessments. Not all events were equally challenging to construct for all the participating children. Some children may have been more familiar with particular events, which would make it easier for them to construct a more convincing narrative, while some other events could have been entirely unknown and, therefore, more difficult to construct. For that reason, the assessments of the stories reported by the same child were averaged out to cancel out the effect of the specific event and to get more valid measures. The interclass correlation coefficient was calculated to determine the inter-rater agreement of the 15 independent assessors and the objectivity of the children's assessed persuasiveness. The results show a high agreement of the assessors in assessing the indicators of the ability to give false statements. The range of interclass correlation coefficients was from .87 (Persuasiveness of the story content) to .98 (Richness of the story details). However, the assessments of the child's persuasiveness in giving false statements were highly correlated with the assessments of the persuasiveness of the story content ($r = .92$, $p < .01$) and with the assessments of the persuasiveness of nonverbal behavior ($r = .88$, $p < .01$). Based on these results, it can be concluded that the assessors did not adequately differentiate these measures, which is why assessments of the story content persuasiveness and persuasiveness of nonverbal behavior were excluded from further analysis.

Table 1
Descriptive measures of indicators of the ability to give false statements

	M	*SD*	Empirical range	Theoretical range	*K–S* test	*p*
Persuasiveness in giving false statements	2.93	0.68	1.58-4.07	1-7	0.09	.20
Richness of the story details	3.79	1.16	1.51-5.67	1-7	0.12	.09
Child's level of anxiety	2.82	0.66	1.51-4.37	1-7	0.07	.20

We registered acceptable individual differences in the indicators of the ability to give false statements, while the arithmetic mean of the assessments is somewhat lower than the theoretical one (4), which is to be expected. Distri-

butions of the indicators of the ability to give false statements did not significantly deviate from the normal distribution.

The relationship between age and the ability to give false statements

We expected that older children would, on average, be assessed as more convincing when giving false statements compared to younger children. As can be seen in Table 3, significant differences were obtained between children of different ages in their persuasiveness when giving false statements ($F(2, 45) = 4.98$, $p < .01$), as well as in the number of details ($F(2, 45) = 23.45$, $p < .01$). The overall one-way ANOVA results are significant, so we performed post hoc LSD tests and found that there were differences in the general persuasiveness and richness of detail between children aged 6 to 7 years and two older age groups – children aged 10 to 11 ($Md_{pers} = -0.61$, $p < .01$; $Md_{rich} = -1.94$, $p < .01$;) and children aged 13 to 14 ($Md_{pers} = -0.61$, $p < .01$; $Md_{rich} = -1.44$, $p < .01$). No differences were found between children aged 10 to 11 years and children aged 13 to 14 years ($Md_{pers} = -0.001$, $p = .99$; $Md_{rich} = -0.49$, $p = .09$). Older children were more convincing in giving false statements, and their story content was richer in detail than that in children aged 6 to 7 years.

Table 2
Indicators of the ability to give false statements of children of different ages

	6-7 years		10-11 years		13-14 years		*F* statistic
	M	*SD*	*M*	*SD*	*M*	*SD*	
Persuasiveness in giving false statements	2.53	0.51	3.14	0.59	3.14	0.77	4.98**
Richness of the story details	2.66	0.86	4.60	0.60	4.10	0.99	23.45**
Child's level of anxiety	3.04	0.58	2.79	0.61	2.64	0.75	1.59

Note. ** $p < .01$.

Differences in the ability to give false statements between girls and boys

The results show that there are no differences in persuasiveness between girls and boys when giving false statements ($t(46) = -0.82$, $p = .42$), neither in the richness of details in the story ($t(46) = -0.92$, $p = .36$) nor in the level of anxiety ($t(43) = 0.32$, $p = .75$). Differences between boys and girls at different age groups were not analyzed due to the insufficient number of participants (only eight girls and eight boys in each age group).

Cognitive and social correlates of the ability to give false statements

As described, teachers assessed the intelligence, verbal ability, popularity, and antisocial behavior of each child. The descriptive measures and the reliability of the assessed characteristics can be seen in Table 3.

Table 3
Descriptive measures and reliability of assessments of intelligence, verbal ability, popularity, and antisocial behavior

	M	*SD*	Empirical range	Theoretical range	α
Assessment of intelligence	4.89	1.96	1-7	1-7	.98
Assessment of verbal ability	5.57	1.53	1.33-7	1-7	.94
Assessment of popularity	4.98	1.57	1.67-7	1-7	.93
Assessment of antisocial behavior	2.43	1.75	1-7	1-7	.95

The results show (Table 4) that children with higher school achievement and those who are assessed by a teacher as more intelligent, verbally capable, and popular among peers are also assessed by a group of independent assessors as more persuasive when presenting false statements. Greater richness of details when giving false statements was produced by children who were assessed as more intelligent and children with higher school success. Children who were assessed to be more intelligent, verbally capable, and more popular among peers were also assessed as less upset when giving false statements.

Table 4
Descriptive measures and reliability of assessments of intelligence, verbal ability, popularity, and antisocial behavior

	Richness of the story details	Child's level of anxiety	School achievement	Assessment of intelligence	Assessment of verbal ability	Assessment of popularity	Assessment of antisocial behavior
Persuasiveness in giving false statements	.62**	-.68**	.41**	.49**	.45**	.37**	-.20
Richness of the story details		-.40**	.40**	.38**	.28	.25	-.21
Child's level of anxiety			-.23	-.34*	-.40**	-.29*	.25
School achievement				.53**	.41**	.34*	-.18
Assessment of intelligence					.71**	.63**	-.52**
Assessment of verbal ability						.61**	-.59**
Assessment of popularity							-.64**

Note. * $p < .05$. ** $p < .01$.

Discussion

In this research, a new procedure for examining lying, i.e., giving false statements, in children was applied. As opposed to the commonly used temptation resistance paradigm, this new procedure is also applicable to older children, so it was possible to use it to directly compare the success of giving false statements between children in lower and upper grades of elementary school. The given results show that older children give false statements in a more convincing and sophisticated way when compared to younger children, which is in line with the findings of previous research in which the ability to lie was assessed in a different way (DePaulo et al., 1982; Evans & Lee, 2013; Lee, 2013; Talwar et al., 2006). The results of this research show that older children, aged 10 to 14 years, are more convincing when giving false statements in comparison to younger children, aged 6 to 7. The absence of difference between ten-

year-olds and thirteen-year-olds can indicate that the period between the ages of eight and ten is very significant for further development of the ability to lie more convincingly and in a more sophisticated way, which is in line with the finding of Talwar and Lee (2002) that children younger than 8 years old cannot fully control their verbal and nonverbal behavior when lying. Since the ability to mentalize has an important role in successful lying (Frith, 2012), it is possible that the development of certain metacognitive abilities that are believed to develop later, between the ages of eight and ten (Veenman et al., 2006), is responsible for the greater persuasiveness of lying in children aged 10 to 14, in comparison with younger children aged 6 to 7 years.

Children aged 6 to 7 years produce fewer details about false events; find it harder to move away from simply repeating the given structure of the event, and devise additional new information to a lesser extent. Even the very content of their stories seems less plausible (e.g., "*Me and my sister were playing with a ball... and I once kicked the ball hard and broke the neighbor's window. And then after the neighbor again bought a new window... and I broke it again, but after that, I went inside and my sister and...she again broke his window. After, I went outside without my sister... she was inside the house, and I was playing outside again. And after that, I didn't break the neighbor's window, but I played with the bicycle*").

The findings of previous research about the question of the existence and direction of differences in gender when it comes to the ability to lie are inconsistent, and there are vast differences in the ways in which the successfulness of lying was measured. Based solely on the assessment of nonverbal behavior, higher success in lying was registered in girls, but only in younger ages (Feldman et al., 1999). In the research by Talwar and colleagues (2006), parents were trained to help their children devise the best possible fabricated narrative about an event that had never happened to them, and then they practiced with them how to present certain events in the most convincing way. The simulated false testimonies of girls were shown to be more convincing than the false testimonies of boys. As possible explanations for this finding, the authors state the bias of adult assessors who might find girls more credible or perhaps the greater motivation and effort of girls when practicing and preparing the false narratives. In this research, where children were asked to independently devise the most convincing narrative about a false autobiographical event and to then present it in the most convincing way possible in order to deceive others that it actually had happened to them, without any help from others and previous practice, no differences were found the persuasiveness of lying between girls and boys.

Children who were judged by the class teacher or other teacher as being able to acquire knowledge and solve tasks faster and more efficiently, and to better understand relationships and cope better in new situations, and who also have higher school success are more successful in lying – they seem more convincing, provide more details and are less anxious when giving false state-

ments. Although they share the methodological variance, high correlations of the order of 0.4 were obtained. The obtained findings suggest that intelligence is a significant determinant of the ability to give false statements, i.e., that success in giving false statements represents a cognitive challenge to which children with higher cognitive capacity respond more adequately.

In addition, the children who were assessed as more popular among their peers and more verbally capable were more convincing when giving false statements, while no significant differences were found in the persuasiveness of children with more or less pronounced antisocial behavior. Popularity among peers is one of the indicators of developed social skills. As in previous research (Feldman et al., 1999), it was shown that this kind of popularity among peers is positively correlated with the ability to lie in children. Children who are more popular have more developed social skills, which probably increases their persuasiveness when producing false statements. False statements can be given with the goal of facilitating social interaction, making an impression, or forming friendships (Kashy & DePaulo, 1996, according to Feldman et al., 1999). People with more developed social skills are able to better control their behavior, which can lead to more successful lying.

Despite the authors' expectations, a correlation between the ability to give false statements and antisocial behavior was not registered, and there can be different reasons for that. The observed distribution of assessments of antisocial behaviors significantly deviates from the normal distribution, as most students were assessed with the lowest grades on the scale of antisocial behavior. Consequently, individual differences in the manifestation of antisocial behavior of students were not registered to a sufficient extent. This type of distribution of data indicates several potential limitations. Extreme manifestations of antisocial behavior should not be expected in the non-clinical population, so accordingly, the items should have been formulated differently (e.g., instead of "*This child often starts physical confrontations with other children*," the item can be formulated in the following way – "*Sometimes this child participates in physical confrontations with other children*"). Also, due to the voluntary registration of students for participation in the research, the question of sample bias may be raised. It is assumed that students who independently applied to participate in the research are more cooperative, which could have led to the curvature of the distribution of assessments of students' antisocial behavior. Given all of the above, in future research, it would be important to ensure a more representative sample of students in order to avoid the stated limitations. Finally, the lack of correlation between the ability to give false statements and antisocial behavior can also be explained by limitations related to the validity of the applied procedure for measuring the ability to give false statements.

Limitations of the research

It is necessary to consider the validity of the applied procedure for measuring children's individual differences in the ability to give false statements. The possibility that the registered individual differences in the ability to lie are a consequence of differences in the motivation of students to demonstrate their abilities cannot be ruled out. It is possible that more successful students, who are more aware of socially desirable behavior, approached the task with more motivation in the desire to demonstrate their high abilities. If the more successful students had put more effort into devising and presenting false autobiographical events, this could explain why the observers assessed them as more convincing and less anxious and why they produced more details. Accordingly, in future research where a similar procedure would be used to measure the ability to give false statements, it would be necessary to control the degree of the participants' motivation to respond to the requirements of the task.

In addition, one of the shortcomings of this study is the somewhat artificial situation (the presence of a camera), and also the fact that the participant is instructed to deceive someone who will later watch the recording, which could have decreased the motivation to lie due to the lack of stake. Although the researchers' explanation that they want to assess who can tell the best story somewhat ensured the children's motivation to participate in the procedure, this situation differs from everyday situations in which children most often resort to lying.

Additionally, even though the researchers did not detect negative reactions in the children, the presence of a camera and researchers whom the children did not know before, could have induced anxiety to a certain extent, so it is suggested that in future research, it would be useful to take into account the anxiety of the participants as a disposition that could be a significant covariate.

The subjectivity of class teachers' and other teachers' assessments also represents a limitation. The assessments were collected from only one person, and it was not possible to control the teachers' ability to assess specific characteristics, which can be affected by many factors such as work experience. High intercorrelations were registered between the assessed characteristics, which are most likely due to the "halo effect" or other biases of the teachers. In order to overcome this shortcoming, in future research, it would be desirable to use validated instruments for assessing specific characteristics and traits in children, which includes individual testing by psychologists (intelligence tests, standardized scales for assessing behavioral problems, interviews, etc.).

Conclusion

This research was conducted with the goal of examining children's ability to lie and its correlates. The findings show that older children are more successful in giving false statements than younger children. However, no differences were found in the ability to give false statements between boys and girls. It was shown that certain characteristics could be important when devising and producing persuasive false content. Intelligence, verbal ability, and popularity among peers are positively correlated with the ability to give false statements.

Keeping in mind the stated limitation of this study, such as the nonrepresentative sample, the potentially subjective assessments of class teachers and other teachers, and the inadequate formulation of specific indicators of the children's characteristics, the findings of this research are significant for further development of this area of study and can have implications in different contexts of children's social functioning. Research on children's ability to fabricate false narratives and to present them convincingly is very important in the area of forensic psychology and forensic medicine (Talwar & Crossman, 2012). The results of this research highlight the importance of children's age and some of their cognitive and social characteristics, which could all be taken into account in situations where children testify in court proceedings and when assessing the credibility of their testimony.

Authors' note

Part of the results of the paper is presented in the form of a poster presentation at a scientific conference: Stojković, A. & Milosavljević, N. (2016, November 4). How children tell a lie: gender and school achievement differences in children's lie-telling [Poster presentation]. Trieste Symposium on Perception and Cognition, Trieste, Italy. https://www.openstarts.units.it/handle/10077/14739

Funding

This research was funded by the Ministry of Education, Science and Technological Development of the Republic of Serbia (Contract No. 451-03-9/2021-14/200018) and is also a result of work on the Project "Identification, measurement, and development of the cognitive and emotional competencies important for a Europe-oriented society" (Grant/Award Number: 179018), funded by the Ministry of Education, Science and Technological Development of the Republic of Serbia.

Conflict of interest

We have no conflicts of interest to disclose.

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Appendices

Appendix A: List of Events

Main events

1. Imagine you ate something bitter when you were at the seaside and that you felt nauseous afterward. Be as convincing as possible and describe the event in order to convince others that it really happened to you.

2. Imagine you went to the park with someone and a storm started. Be as convincing as possible and describe the event in order to convince others that it really happened to you.
3. Imagine that you kicked a ball so hard that you broke the window of your neighbor's house. Be as convincing as possible and describe the event in order to convince others that it really happened to you.

Replacement events

1. Imagine that you went for a walk with someone and got lost. Be as convincing as possible and describe the event in order to convince others that it really happened to you.
2. Imagine that you went on a school vacation with your friend and that at one point you realized that your friend got lost. Be as convincing as possible and describe the event in order to convince others that it really happened to you.
3. Imagine that while walking with someone, you came across a lost wallet. Be as convincing as possible and describe the event in order to convince others that it really happened to you.
4. Imagine you went to the store with someone and came across a starving kitten on the way there. Be as convincing as possible and describe the event in order to convince others that it really happened to you.

Appendix B: Instruction for children

"I would like to see how well you can tell stories and who can better tell a story that I start. I'll read you a total of three short sentences describing events. You should imagine that each event happened to you. So, it has not happened to you, but you imagine that it has. Try to come up with and tell the story of that event, as if it happened to you, but as convincingly as possible, so that you convince me that it really happened to you. When I read out the event, you have about 1 minute to come up with a story and about two minutes to tell your story. After you come up with the story, you can start telling it. I also have a task. My task will be to film you while you are telling each of these three stories. When the time is nearly up, I will give you a hand signal (show the child a hand signal) so that you know that the time will be up soon and you can slowly start finishing. The video recordings will be sent to some students who will try to assess how well you told these stories. The success of our research depends on you, so please do your best to tell the stories as convincingly as possible so that those who watch videos believe that it really happened to you. Now I am going to read you a sentence based on which you will make up your story, okay? You have a minute to come up with your version of this event."

Appendix C: Assessment Inventory for Teachers

This is a questionnaire for the assessment of the abilities and characteristics of a particular child. Please rate each child's abilities on a scale from 1 (*does not apply to this child at all*) to 7 (*fully applies to this child*) as accurately as you can. The data will be used exclusively for research purposes, and all personal information will remain confidential. Thank you for your cooperation!

Name and surname of the child: _____
Class: _____

POPULARITY (LIKABILITY)	
1.	Other children in the class like to spend time with this child.
2.	This child is often a role model for other children.
3.	This child likes to be and often is the center of attention when they are in the company of other children.
ANTISOCIAL BEHAVIOR	
1.	This child often starts physical confrontations with other children.
2.	This child often verbally attacks (insults) other children.
3.	This child often violates school rules.
INTELLIGENCE	
1.	This child successfully recognizes relationships and copes well in new situations.
2.	This child is able to solve tasks of different difficulties quickly and efficiently on their own, without the teacher's additional help.
3.	Compared to other children, this child acquires knowledge faster and more efficiently.
VERBAL ABILITY	
1.	This child speaks fluently and clearly.
2.	Compared to other children, this child has a more extensive vocabulary.
3.	This child has no difficulty in verbally expressing what they think.

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VERUJ MI DA TE LAŽEM*: SPOSOBNOST LAGANJA KOD DECE I NJENI KORELATI

Laganje se kod dece javlja veoma rano. Fokus prethodnih istraživanja uglavnom se odnosio na sposobnost laganja kod dece predškolskog uzrasta. U ovom istraživanju korišćenjem nove procedure, cilj je bio ispitati sposobnost davanja lažnih iskaza kod dece školskog uzrasta, kao i kognitivne i socijalne korelate uspešnosti dece u davanju lažnih iskaza. Ukupno 48 dece, po 16 učenika prvog, petog i osmog razreda osnovne škole imali su zadatak da osmisle lažni autobiografski narativ i da ga što uverljivije izlože kako bi ubedili druge da im se to stvarno dogodilo. Uverljivost njihovih snimljenih izlaganja procenjivalo je 15 nezavisnih procenjivača. Od učitelja i razrednog starešine na osnovu posebno konstruisanog inventara prikupljene su procene inteligencije, verbalne sposobnosti, omiljenosti među vršnjacima i antisocijalnog ponašanja svakog učenika. Rezultati pokazuju da su deca uzrasta od 10 do 11 godina i deca uzrasta od 13 do 14 godina procenjena kao uverljivija prilikom davanja lažnih iskaza u odnosu na mlađu decu, uzrasta od 6 do 7 godina. Međutim, nije dobijena razlika u uspešnosti davanja lažnih iskaza između dece uzrasta od 10-11 godina i dece uzrasta od 13 do 14 godina, kao ni razlika u sposobnosti davanja lažnih iskaza između devojčica i dečaka. Deca sa višim školskim postignućem i ona koja su procenjena od strane razrednog starešine ili učitelja kao inteligentnija, verbalno sposobnija i omiljenija među vršnjacima su takođe od strane grupe nezavisnih procenjivača procenjena kao uverljivija pri izlaganju lažnih autobiografskih događaja.

Ključne reči: inteligencija, kognitivni razvoj, laganje, lažni iskazi, popularnost među vršnjacima

* Reči upućene ispitivaču tokom učešća u istraživanju (ispitanica, 7 godina).

PRIMENJENA PSIHOLOGIJA, 2021, Vol. *14* (1), STR. 103-115

UDK: 364.624.6:796.015.8
Research Article
doi: https://doi.org/10.19090/pp.2021.1.103-115

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Received: 17.11.2020.
Correction received: 04.03.2021.
Accepted: 17.03.2021.

RETHINKING THE ROLE OF ANXIETY AND SELF-EFFICACY IN COLLECTIVE SPORTS ACHIEVEMENTS

The influence of an athlete's anxiety and self-efficacy on sports achievement has been the subject of numerous research, but their relationship is not fully understood. In our research, we try to explore the influence of competitive anxiety and General Self-Efficacy on sports achievement. To explore that relationship, we examined 76 active athletes in collective sports. The following instruments were applied: Competitive State Anxiety Inventory, General Self-Efficacy Scale, and Questionnaire of Sports Achievement (ad hoc made instrument). The results show that Cognitive anxiety (a dimension of the Competitive anxiety) negatively correlates with sports achievement ($r = -.38$, $p < .01$) contrary to another dimension - Somatic anxiety that does not show a significant association with achievement. However, the highest relationship is a positive correlation between General Self-Efficacy and sports achievement ($r = .51$, $p < .01$). In Regression analysis, significant predictors of sports achievement are General Self-Efficacy ($\beta = .39$; $p < .01$) and Cognitive anxiety ($\beta = -.24$; $p < .05$). Additional Bootstrapping analyses were conducted to examine the potential mediating effect of General Self-Efficacy in the relationship between Cognitive anxiety and sports achievement. We found a significant indirect effect of Cognitive anxiety on achievement only through General Self-Efficacy (b = -.30, CI [-.73, -.07]), while the direct effect is not significant once the mediator is introduced. In the reversed analyses, with Cognitive anxiety as a mediator, the mediation was not significant, which means that high anxiety reduces sports achievement only through undermining self-efficacy and not directly. The obtained result suggests that self-efficacy has the primary role in sports achievement. Consequently, we suggest that for improving sports achievement, psychological intervention should primarily focus on increasing self-efficacy.

Keywords: self-efficacy, cognitive anxiety, competitive anxiety, collective sports, sports achievement

Introduction

To what extent and in what ways athlete's concerns about success and self-confidence impact their sports achievement? This question has long been the target topic of numerous studies in sports psychology, as well as meta-analytical studies (e.g., Klein, 1990; Levy et al., 2011; Moritz et al., 2000; Woodman & Hardy, 2003). In the relevant literature, this question mainly revolves around the term performance anxiety. Performance anxiety has been considered as a specific form of social anxiety which, as a rule, does not occur in other areas of life, and hence, it can be viewed as a state, rather than a trait. If a stressful situation/event is to be defined as one that represents a certain kind of challenge or threat to a person (Deckers, 2018), sports competitions can be considered as stressful, as they challenge the athlete by default and are the requirement for a particular achievement.

With the construction of the Competitive State Anxiety Inventory-2 (CSAI-2) Martens et al. (1990) introduced the concept of multidimensional anxiety state (cognitive anxiety, somatic anxiety and self-confidence) into the field of sport psychology. The authors define cognitive anxiety as negative expectations and concerns about one's ability to perform and the possible consequences of failure, while somatic anxiety is being described as a personal perception of physiological effects of the anxiety experience such as palpitations, tense muscles, shortness of breath and other signs of autonomic arousal. Following this concept of multidimensional anxiety, Martens et al. (1990) suggest the combination of the somatic and cognitive component of anxiety, together with self-confidence, to be the tipping point of sports performance anxiety. Self-confidence represents athlete's belief "in meeting the challenge of the task to be performed" (Woodman & Hardy, 2003). These three components of competitive anxiety are different, but significantly related and expressed in various stages of sports achievements.

The somatic component of anxiety refers to its physiological and emotional aspects, while in its essence they are a direct consequence of the physiological activation. As a consequence of this activity, an athlete experiences a series of physical symptoms (i.e., arousal), and these symptoms are being recognized as nervousness and tension (Dosil, 2004). It is of great importance to note that somatic anxiety can affect sports efficiency depending on how the athlete perceives and interprets (e.g., horrifying, catastrophic or benign) these physical sensations often manifested through muscle tension or accelerated heart rhythm (Gould et al., 2002). Cognitive anxiety (trepidation or worry), as a mental component, occurs as a result of negative expectations regarding the outcome of the competition, mistrust in oneself, or doubts about one's abilities (Martens et al., 1990; Williams, 2010). The presence of cognitive anxiety is reflected in athletes' negative self-evaluation, which leads to excessive worrying, reducing one's ability to accomplish sports tasks effectively. Third component in the multidimensional theory of competitive anxiety, according to Martens et

al. (1990), is self-confidence. In sport, the term self-confidence referes to the belief of one's abilities and skills required for achieving succes in certain sport situation (Vealey & Chase, 2008). Self-confidence is widely considered as a cornerstone of success and affirmation in sport. Although it is referred to as the manifestation of anxiety, confidence is not based on the clear-cut measure, but it is often assessed as to its absence. In light of that, cognitive anxiety is usually found in negative correlation with self-confidence (Besharat & Pourbohlool, 2011; Craft et al., 2003).

Considering the relationship between anxiety and successful sports performance, there is a straightforward negative link between these two. In a competitive situation, successful sports performance relies on mild somatic anxiety (arousal) and low cognitive anxiety (Woodman & Hardy 2003). Mild somatic anxiety helps the athlete to achieve and maintain the optimal level of activation, required for the (successful) performance of a particular physical activity. Each athlete may have a certain level of anxiety before or during competitions. While some athletes experience non-disturbing, lower intensity arousal (that is "positive jitters"), others experience intense and, hence, disturbing or blocking levels of trepidation. If high anxiety persists across different sport competitions, it directly affects the athlete's achievement, most likely decreasing it. It further resonates as additional negative information for the athlete that s/he is not good enough, that s/he cannot achieve the desired results, affecting their self-confidence, and, consequently, entering into a series of unsuccessful moves, bad decisions, and lost matches. In other words, the self-fulfilling prophecy.

Hardy (1999) makes a distinction between cognitive and somatic anxiety in terms of focus – hence, cognitive anxiety refers to the athlete's concern about the success of his sporting performance, but also the concern about the possible consequences of failure; and somatic anxiety relates to the perception of current physiological response on psychological stress. This definition of somatic anxiety reflects an athlete's interpretation of vegetative arousal. Therefore, the essential difference between cognitive and somatic anxiety, in the context of multidimensional measures, is the content of the assessment - perceived cognition or perceived somatization.

Levels of cognitive and somatic anxiety rise as the competition approach and reach its peak right before the beginning of the competition. When the match starts, somatic anxiety is radically decreasing, and the course of the game dictates the variation in cognitive anxiety. The mistakes that athletes make in the competition are, as a rule, the effects of cognitive, rather than somatic anxiety, and therefore, cognitive anxiety is inversely proportional to achievement. More specifically, the increase in cognitive anxiety leads to a decline in sporting achievement (Cox, 2002). Most research aimed at examining sports anxiety shows that a critical construct that needs to be explored is cognitive anxiety (Bridges & Knight, 2005; Dunn & Dunn, 2001). This term refers to the kind of anxiety that is oriented to the future and occurs in situations

where an athlete's attention is focused on the expected obstacles, or when potential failure is foreseen (Bridges & Knight, 2005; Dunn & Dunn, 2001). The general assumption is that only the presence of cognitive anxiety can diminish the athlete's performance, because a particular way of thinking generates it, i.e. focusing on potential hazards and obstacles and, as such, it can cause not only the anticipation of failure but the failure itself.

In addition to anxiety, the experience of general self-efficacy (a particular aspect of self-confidence in a specific activity) is an essential psychological construct regarding the success and achievements of athletes. Bandura's (Bandura & Walters, 1977) theory of self-efficacy is one of the most widely used approaches in assessing the relationship of self-confidence in sport and motor skills (Heazlewood & Burke, 2011). Bandura defines self-efficacy as an individual's belief in their competence and success on a specific task or group of functions, and suggest that self-efficacy is a crucial part of the achievement. The higher the self-efficacy, the higher the performances and the lower emotional excitement is. Percieved success increases expectations of future successes, while failure reduces it. In the context of Bandura theory, self-efficacy is a common cognitive mechanism mediating human motivation and behaviour. Our evaluation of our own ability to act at a certain level influences our practice, our cognitive schemes and our emotional responses in demanding and challenging situations. In the context of a sporting event, the assessment of self-efficacy is the primary determinant of the athlete's behaviour, because the competition itself contains specific incentives and requires the engagement of certain skills and techniques. Also, Bandura in his theory states that these estimates are the results of a complex process of self-assessment and self-assertion of individuals based on different information on efficiency (previous success, self-talk, as well as individual physiological states). Maddux (1995) added two more categories significant for this process - emotional states and imaginary experiences. Previous achievements are considered to be the most important source of information about efficiency. If an individual perceives their experience as successes, the beliefs of self-efficacy will increase, and if he sees them as failures, the experience of self-efficacy will decline. Relaxation after easy success and reinforcement after failure is the usual sequence of competitive "sinusoids" (Bandura & Walters, 1997). Information on efficiency in sports can be acquired through comparison of an individual's progress and comparison with others. This implies observing the performance of other athletes and the use of this information in the process of an athlete's performance (Maddux, 1995). Such information is easily accessible in collective sport, so players often use them to develop and improve their self-efficacy. During training or match, each player has the opportunity to assess their performance and compare it to other members' performance. Research done on athlete shows a positive correlation between perceived self-efficacy and performance in many sports (through invested effort and perseverance in sports activities). A proper assessment of its efficiency helps athletes and reduces the fear of injury to

the lowest level and thus increases the success in acquiring new motor skills (Perkos et al., 2002). A meta-analysis of the work carried out by Moritz et al. (2000) shows that there is a positive and significant connection between self-efficacy and sporting achievement (the average correlation in the analysed works is moderate and is .38).

The aim of this study is to examine the relationship between competitive anxiety, self-efficacy and sport achievement. Previous literature review reveals an unresolved relationship between anxiety and self-efficacy - is low general self-efficacy a basis for the development of anxiety in general, and therefore, competing anxiety, or does anxiety produce low general self-efficacy and thus a lack of competitive self-confidence? We tried to answer this question in the present study.

Method

Participants

The present study included a convenient sample of 76 active athletes (70% male, age: M = 18.38; SD = 3.94) engaged in team sports (handball 71%, football 18%, water polo 11%). The research was conducted in sports clubs in Serbia. Questionnaires were administered individually and anonymously, and participants were informed about the purpose and investigative nature of the study. Before questionnaire administration, all participants signed the Informed Consent.

Instruments

The Revised Competitive State Anxiety Inventory-2 (CSAI-2R)

To assess competitive anxiety, we used *The Revised Competitive State Anxiety Inventory-2* (CSAI-2R; Cox, Martens, & Russell, 2003), which consists of three subscales Somatic anxiety, Cognitive anxiety and Self-confidence. In this paper, we used subscales, which refers to Somatic and Cognitive anxiety. Somatic anxiety subscale (7 items) registers the intensity of tension in the body and abdomen, agitation, heart palpitation, hand sweating, dry throat, wet and cold hands, etc. (item example: "*My body feels tense*"). Cognitive anxiety subscale (5 items) asses athlete's concern about the quality of his or her sports performance, doubts about themselves and their abilities, fear of failure, and anxiety over a possible disappointment of a significant person (item example: "*I am concerned about losing*"). Each item is set to a four-point Likert scale. Higher scores indicate higher performance anxiety.

General Self-Efficacy Scale *(GSE)*

Self-efficacy was assessed using the *General Self-Efficacy Scale* (GSE; Schwarzer & Jerusalem, 1995). The scale is designed following Bandura's theory and consists of several examples of everyday problems and how one deals with them. The questionnaire consists of 10 items, which are answered on a 4-point Likert type scale (item example: "*I can solve most problems if I invest the necessary effort"*). The higher score points to a higher perceived self-efficacy.

Sports Achievement

Sports achievement was assessed with the questionnaire designed for this study, in which participants gave self-assessment of their sports performance on an annual basis. Instrument consists of 6 items with the 7-point Likert scale (item example: "*I get great results*").

Results

Table 1 shows descriptive characteristics of variables in the study. All variables show satisfactory reliability, and values of skewness and kurtosis suggested that the deviation of data from normality was not severe (Tabachnick & Fidell, 2013) and fulfill the basic conditions for the implementation of the further data analyzes.

Table 1
Descriptive statistics for variables in the study

Scale	Theoretical range	Achieved range	*M*	*SD*	α	*Sk*	*Ku*
General Self-Efficacy	10-40	16-40	33.45	5.24	.89	-0.95	1.28
Cognitive anxiety	4-20	4-20	8.72	4.04	.82	0.74	-1.15
Somatic anxiety	8-40	8-40	21.48	9.32	.92	0.35	-1.18
Sport achievement	6-42	20-42	35.23	5.60	.83	-.1.06	0.77

Note. *M* – mean; *SD* – standard deviation; α - alpha reliability; *Sk* – skewness; *Ku* – kurtosis.

In the analysis of the results we paid attention to only two dimensions from the CSAI questionnaire: Cognitive and Somatic anxiety, while the third dimension – Self-confidence was not analyzed, considering it as a redundant,

or a particular situation of self-efficacy (in sports), which was why it was expected that this factor highly correlate with General Self-Efficacy.

Table 2

Intercorrelations among variables

Variable	1	2	3	4
1. General Self-Efficacy	-	-.50**	-.34*	.51**
2. Cognitive anxiety		-	.12	-38**
3. Somatic anxiety			-	-.02
4. Sport achievement				-

Note. *$p < .05$; ** $p < .01$.

In Table 2, we can see that Cognitive anxiety is significantly related to Sports achievement, in contrast to Somatic anxiety. Specifically, Cognitive anxiety is negatively correlated with Sport achievement ($r = -.38$, $p < .01$). However, the highest correlation with Sports achievement shows General Self-Efficacy ($r = .51$, $p < .01$).

Table 3

Summary of Linear Regression Analysis

	R^2	F	SE	β	t	r
General Self-Efficacy	.26	8.36	4.85	.38**	3.36	.45
Cognitive anxiety				-.24*	-2.14	-.37
Somatic anxiety				.07	0.76	-.02

Note. *$p < .05$; ** $p < .01$.

In order to examine which of the factors most predicts Sports achievement, we conducted Regression Analysis. Predictors consisted of General Self-Efficacy, Cognitive anxiety, and Somatic anxiety. The results are shown in Table 3. We see that the regression model is significant ($R^2 = .26$; $p < .01$) and that the predictors contribute 26% to the explanation of the variance of sports achievement as a criterion variable. The most significant individual predictor is General Self-Efficacy (β = .38, $p < .01$), while Cognitive anxiety predicts Sports achievement in a negative direction (β = -.24, $p < .05$). According to post hoc power analysis (Faul et al., 2007), which is conducted to estimate achieved statistical power of given α, sample size, and effect size, we obtained critical F = 2.73, for α error probability 0.05, *ES(f2)* = 0.15, and actual power = .80.

In order to examine the relationships between the variables in more detail, we analyzed their possible mediating effect. We checked the mediator's influence of General inefficiency in relation to two types of competitive anxiety

(Cognitive and Somatic) and Sports achievement (Figure 1). Two "Bootstrapping" analyzes were carried out using the Hayes PROCESS macro.

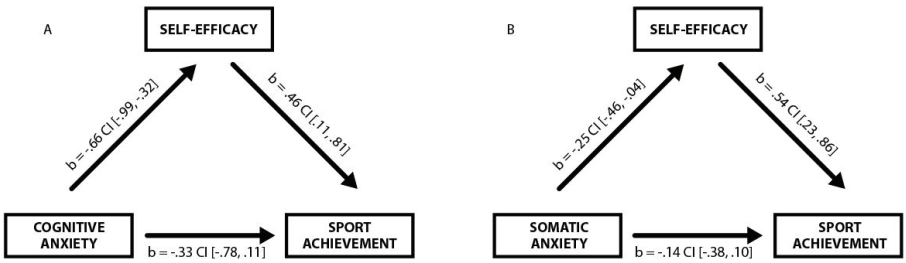

Figure 1. Analysis of mediating effects.

The results revealed that only the indirect effect of Cognitive anxiety on the Sports achievement through General Self-Efficiency is significant (*b* = -.30. *CI* [-.73. -.07]), while direct effect, remains insignificant (Figure 1a). This result suggests the total mediation of General Self-Efficacy on the relationship between Cognitive anxiety and Sport achievement. Similar results (Figure 1b) are obtained for Somatic anxiety (*b* = -.13 *CI* [-.40. -.004]). These results indicate that high levels of anxiety reduce sport achievement solely by reducing the self-efficacy experience, and not directly. It is important to note that in the inverse analysis, that is, when the anxiety variables were set up as mediators, mediation was not significant.

Discussion

The purpose of this study was to explore the influence of somatic and cognitive anxiety, as well as of general self-efficacy on sport achievement. The research question was whether low general self-efficacy is the basis for the development of competitive anxiety or anxiety produces a low general self-efficacy of the athlete? Clarifying this relationship is essential for designing effective psychological treatments within sports psychology that can positively influence the improvement of both individual and collective sports achievements.

To answer research question we firstly conducted regression analysis in which the predictor variables were somatic and cognitive anxiety, as well as general self-efficacy, and the criterion variable was a self-assessment of the sports achievement at an annual level by the competitors in collective sports. In regression analysis, General Self-Efficacy (in positive direction) and Cognitive anxiety (in negative direction) are significant predictors of Sports achievement. However, subsequent "Bootstrapping" analyses with Hays's PROCESS

macro, showed that General Self-Efficacy represents the mediator variable between Cognitive anxiety and Sports achievement. This result means that Cognitive anxiety influences sports achievement only through the level of General Self-Efficacy. A lower level of General Self-Efficacy leads to lower Sports achievement.

In other words, although it is known that anxiety harms sporting performance, our results imply that this relationship is not direct. In this case, anxiety influences self-efficacy and lower self-efficacy negatively affects sports achievement. This result further implies that the target of psychological interventions should primarily be the self-efficacy of the athlete.

Cognitive Behavioral Therapy (CBT) interventions such as imagery, goal-setting, thought management and self-talk, physical relaxation and arousal regulation proved to be effective both in improving self-efficacy and reducing anxiety (Vealey & Forlenza, 2013; Van Raalte et al., 2016; Zakrajsek & Blanton, 2017). CBT is also considered as a treatment of choice for the management of sport-related anxiety (Martnes et al., 1990; Smoll & Smith, 1996). In general, the individuals or groups work with the psychologist or therapist to address the negative thoughts and behaviors that underlie the anxiety symptoms.

The recommendation for the practice, but also for the future research, is the design and empirical testing of a specific CBT program aimed to improve the self-efficacy of athletes in collective sports, given that they have been dealt with in this research.

Conflict of interest

We have no conflicts of interest to disclose.

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Appendix

Appendix A: Questionnaire of Sports Achievement

Assess the extent to which each of these statements is true for you in the last year. The numbers have the following meaning: *1 - strongly disagree ... 4 - neutral ... 7 - strongly agree*

1	I achieve great results.	1	2	3	4	5	6	7
2	I often experience success.	1	2	3	4	5	6	7
3	I train regularly.	1	2	3	4	5	6	7
4	I work hard on the training.	1	2	3	4	5	6	7
5	I reach my maximum performance on the field.	1	2	3	4	5	6	7
6	The coach is pleased with my performance on the field.	1	2	3	4	5	6	7
7	I am a real team player, and I stand for the team and cooperate.	1	2	3	4	5	6	7
8	The coach is pleased with my contribution to the team.	1	2	3	4	5	6	7
9	I am motivated by the competitive spirit.	1	2	3	4	5	6	7
10	Victory motivates me. I am motivated by victory.	1	2	3	4	5	6	7

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PREISPITIVANJE ULOGE ANKSIOZNOSTI I SELF-EFIKASNOSTI U POSTIGNUĆU U KOLEKTIVNIM SPORTOVIMA

Uticaj anksioznosti i self-efikasnosti na postizanje sportskog uspeha predmet je brojnih istraživanja u sportu, ali njihov odnos nije u potpunosti razjašnjen. U našem istraživanju pokušavamo da objasnimo da takmičarska anksioznost utiče na sportska dostignuća samo kroz nivo izraženosti generalne self-efikasnosti. Niži nivo generalne self-efikasnosti dovodi do nižih sportskih dostignuća. Da bismo istražili odnos između generalne self-efikasnosti i anksioznosti u vezi sa sportskim postignućima, ispitali smo 76 aktivnih sportista u ekipnim sportovima, kao i njihove trenere. Primenjeni su sledeći instrumenti: Upitnik stanja takmičarske anksioznosti, Skala generalne self-efikasnosti i Upitnik sportskih postignuća. Rezultati pokazuju da kognitivna anksioznost negativno korelira sa sportskim postignućim ($r = -.38$, $p \leq .01$), za razliku od somatske anksioznosti koja ne pokazuje značajnu povezanost sa postignućima. Ipak, najviša veza je pozitivna korelacija između self-efikasnosti i sportskog postignuća ($r = .51$, $p \leq .01$). U regresionoj analizi značajni prediktori sportskog postignuća su self-efikasnost ($\beta = .39$; $p \leq .01$) i kognitivna anksioznost ($\beta = -.24$; $p \leq .05$). Urađena je analiza medijacije kako bi se ispitao potencijalni prediktorski uticaj generalne self-efikasnosti na takmičarsku anksioznost i sportsko postignuće. Dobijeni rezultati pokazuju da kognitivna anksioznost utiče na sportsko postignuće samo kroz nivo opšte self-efikasnosti ($b = -.30$, CI [-.73, -.07]). Niži nivo opšte self-efikasnosti dovodi do nižih sportskih postignuća. Shodno tome, možemo zaključiti da za poboljšanje sportskih postignuća psihološka intervencija treba da bude prvenstveno usmerena na unapređenje self-efikasnosti sportiste.

Ključne reči: self-efikasnost, kognitivna anksioznost, takmučarska anksioznost, kolektivni sportovi, sportsko postignuće

PRIMENJENA PSIHOLOGIJA