EXCELLENCE

Project objectives

The *path* of evolution, *ascension* of a musical scale, *progression* of a series of visual images... All these mental rewritings of complex real-world events seem to involve some sort of directed movement leading to an affective peak. Yet, where in the mind do such "concepts", as cognitive scientists like to call them, come from? What is it that makes them different from, and still somehow similar to one another? How do they hold together knowledge that we acquire from apparently very different perceptual domains? Can one define any stable, abstract principles for generating them? Can these be formalized on a level broad enough to be useful for devising computational models and AI routines?

The present project aims to combine the participants' expertise in theoretical-, corpus- and psycholinguistics on the one hand and multimodality studies (language, music, visual cognition) on the other so as to ***identify at least five sets of dynamic underlying schematic principles which motivate the construction of concepts*** across three semiotic modes (idiomatic and metaphorical constructions in language, constructs from music theory and elementary visual imagery). The intention is to reach deep into abstract principles governing the generation of meanings in the mind by achieving four progressive sets of objectives: (1) locating / inferring / describing *at least five* proof-of-concept instances of *dynamic* schematic concept construction shared by linguistic, musical, and visual phenomena from selected language and multimodal corpora; (2) providing an *in-depth theoretical* explication of the abstract mechanisms behind those instances of cross-modal concept construction, by expanding on the insights of some established approaches in cognitive linguistics (e.g. image schema, metaphor, analogy theories); (3) corroborating the psychological reality of such postulated theoretical constructs in four sets of experiments with human participants, to show that conceptual generation strategies as inferred in the analytic process above are preferred to other parsing possibilities; and (4) rewriting the successful instances of schematic principles behind concept construction from different semiotic modes that have passed the three steps above (allocation in the corpus, theoretical well-formedness, acceptability for experimental participants) in the form of at least five complex scripts / algorithms for future use of experts in the domain of artificial intelligence, to be employed as supplementary tools in semantic processing tasks with which machines still have problems (e.g. metaphor comprehension).

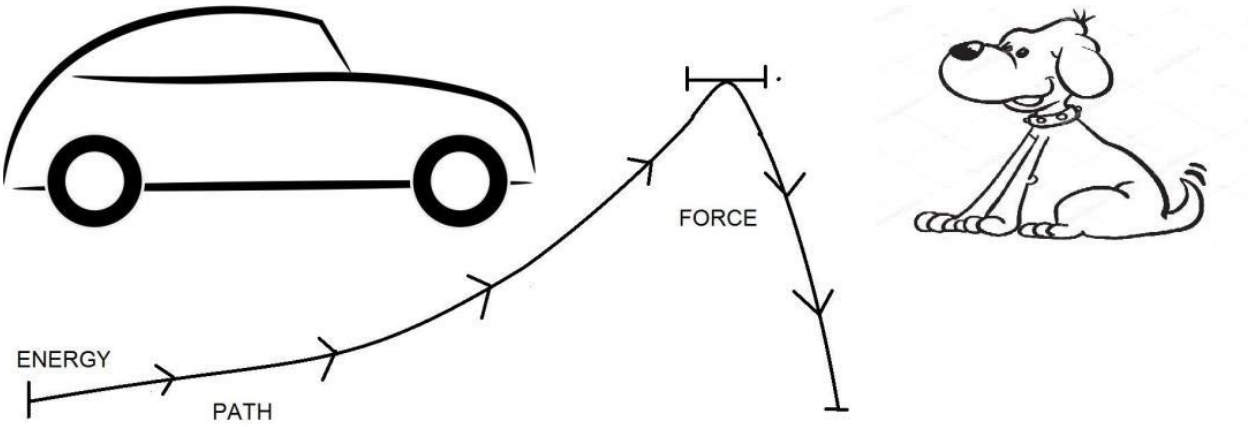
Concept and methodology

The central tenet of the present project, and its possible main contribution to linguistic semantics, cognitive science, and artificial intelligence, lies in the *dynamic* view of the schematicity of conceptual construction that we are proposing. With some exceptions (e.g. Langacker, 1997), this is different from current models in either language sciences or multimedia studies. On one end, one traditionally finds a static approach to concepts, focusing solely on individual schemas that motivate them, as well-described in linguistics and developmental psychology (e.g. *schemas,* Rumelhart, 1980; *image schemas,* Johnson, 1987; *conceptual primitives,* Jackendoff, 1990). On the other, more modern proposals affiliated with connectionism or radical embodiment often offer too holistic, synthetic notions of conceptualization, precluding the possibility of devising formal, computationally-testable models. To illustrate, the former strategy may be found in the frequent localization of schematic *paths* in numerous instances of actual or fictive motion inferred across semiotic modes, be it language idioms ("make a run for it"), musical melodies ("we are heading to that final passage"), or visual presentations (as in a horizontal series of static cartoons presenting the course of evolution). This strategy nicely locates some of these expressions' structural "skeleton", but is at the same time too reductionist, as in the process it strips the resultant concepts of their inherent dynamism. The latter approach, on the other hand, requires too complex referential scenarios to be formally tractable, e.g. when it turns out that one needs to call practically everything one knows about cars, dogs, Christianity, and Buddhism to understand the expression "my karma ran over my dogma" (as in mental spaces or conceptual blending theories, e.g.

Coulson & Oakley, 2000). In an attempt to bring these two traditions closer to one another, we view the dynamics of concept construction as a continuous, online emergent process in which one can still allocate a *series of discrete individual steps* ("milestones"), in the form of *schematic factors* that *interlink with one another*, motivating the final generation of the semantic structure.

To illustrate again, while the existence of *paths* in utterances mentioned above is unquestionable, a deeper appreciation reveals that such an apparently univocal schema (1) may itself be *compositional*, (2) may contain *constitutive elements* that are *more abstract* than inferable from a single example alone, and (3) may present just a *part* of the schematic skeleton of the entire expression. With regard to problem (1), at a minimum, all these instances of "running" have localizable onset, peak, and attenuation points in their schematic *path* representations, with gradual transitions of movement intensity in between; with regard to problem (2) the schematic features they are based on must be abstract enough to allow for some cross-cultural, cross-linguistic or individual variation: depending on the role of the interlocutor, “running for it” can progress linearly from-the-center-towards-the-observer or observer-into-the-depth; the musical passage can consist of tones going “upward” (as in English) or “becoming thinner” (as in Turkish); the path of evolution may progress from left to right or also diagonally upward; finally, with regard to problem (3) as they are being formed, the schemas (again dynamically) combine with *other* schemas to motivate ultimate concepts, as when the *path* of that car leading to the dog progressively teams up with *force* to reach the final effect of (detrimental) collision.

A schematic presentation of "a car hitting a dog" may then look as follows:



Computational structure

Onset - move - increase energy / increase intensity PEAK sharp decrease - end

Three differences compared with previous approaches:
(1) defining schemas as dynamic (path has onset, progression, peak, fall)
(2) concrete realizations of the scenario may vary (moving up, left,... or just reaching a more abstract, "teleological" peak)
(3) schemas interact, and also *dynamically* (in the graph, path moves rightwards, force increases upwards)

Figure 1: The dynamics of the combination of *path* and *force* schemas motivating many cross-modal metaphorical concepts. Arrows and straight lines along the curve mark “schematic milestones”

Importantly, this is just the first gist of the total schematicity underlying the expression. Additionally, one may wish to consider the *type* of movement that is the most salient for motivating the concept, the posture of the agents, the energies involved, any ontological difference between schematic states at different points in time (e.g. the dynamically increasing force as compared to the momentary impact of collision), (in)congruities between the rate of energy increase prior to and following the impact, potential patterns inferable from the way the entire schematic structure motivates *subsequent* concepts in the discourse, etc.

For this reason, inferring at least five such schematic complexes from the corpora will already be a detailed and demanding task. Yet the key idea behind our thinking is that **schematic structures so inferred may further apply to a multitude of referential scenarios.** In other words, if across corpora we are able to find a sufficiently large number of "paths with onsets, peaks, and releases, gradual intensification or diminution of energy in between, that can assume various movement directions, and tend to concatenate with forces" - we can be able to predict the meanings of *new* conceptualizations in which the same schematic sequence occurs. In other words, if we "capture" the (same) underlying dynamics of "a car hitting a dog", "a man hitting on a girl", "a singer hitting the highest key", or "a joke in a slide show hitting the peak", we can then *generalize* the process in which this knowledge applies to a broad selection of creative expressions - such as "at that point you demolished my theory" or "you have really gone way out of line" – or multimodally presented scenarios, e.g. a gradual buildup of suspense in a music phrase or short sequence of images. Ultimately, the approach can have computational implications, since predicting which of these new expressions are possible or not, and making computers "able" to capture elements of their semantic structure based on the inference of the dynamic schematic skeleton that we are proposing, could provide some solid aid to current AI models, for instance of metaphor comprehension.

The present project will thus look for such interlocked, abstract schematic factors concealed in various forms of multimodal expression. To test for any cross-cultural patterns, the corpora will include paired materials from Serbian and English languages / cultures / contexts, from which we shall hope to be able to infer *a minimum of five* such complex schematic conceptual scenarios. The methods thus include: (1) **corpus analysis** of language and multimodal materials in search of instances of underlying, dynamic schematic conceptualization; (2) **devising a theoretical model** to explain the mechanism on which the cross-modal schematizations so inferred operate (based on the extension of elements of accepted theories in cognitive science, notably cognitive linguistics, such as image schema, metaphor, and analogy theories); (3) **running behavioral tests with experimental participants** to check if the parsing mechanisms so proposed are advantageous compared with other salient options; and (4) **singling out** the most successful instances of schematic conceptualization so devised and **rewriting them as formal scripts** to be offered to AI experts as a supplementary tool in their current semantic parsing models (e.g. metaphor comprehension).

The focus, tasks and methodologies so proposed have strong transdisciplinary implications: under the umbrella domain of cognitive science, they intertwine insights of cognitive linguistics (e.g. metaphor theory), psychology (e.g. schema and analogy theory), multimodality studies, music and visual cognition. While participants are themselves not experts in information technology, the ultimate output of the project is aimed at further use in the field of artificial intelligence. As the project develops, practical implications for other fields will also be proposed: e.g. for improving foreign-language teaching methodologies in the domain of concept acquisition or rhetorical and persuasion techniques in public speaking.

The project relates to several other research projects in which the team have participated: PI participated in the national project *Languages and Cultures in Time and Space* (178002) and is currently tenured as president of the Serbian Association for the Study of English. Among other projects, PI took part in the EU-funded Tempus REFLESS project (2010-2013) as project coordinator for Niš University. He is an experienced researcher with expertise in corpus linguistics, morphology and semantics. Workpackage coordinators also have relevant project experience related to the current proposal: P1 was an important language-and-visual-cognition expert on a just-completed national project (179013) and a Fulbright scholar in the well-known Reasoning Lab at UCLA, working on multimodality, psycholinguistics, metaphor, analogical reasoning and conceptualization (2016-2017). Since 2018, he has headed the first Language Cognition Laboratory in Serbia. In addition to a prominent role in the music-and-language section of a just-completed national project (179013), while not a formal participant, P2 has recently collaborated on the H2020-FET-funded *COINVENT* project, which equally targeted concept construction strategies in language, music and mathematics, taking the cognitive linguistic Conceptual Blending Theory as its starting point (an important paper collection, with two contributions by the P2, here). Previously, he worked on concept construction as a Fulbright scholar at Case Western Reserve University (2010-2011) and a "tandem" research scholar financed by the German Excellence Initiative at the University of Freiburg (2012-2013). Since 2013 he has headed the Center for Cognitive Sciences at the University of Niš, the first such institution in Serbia. P3 is a syntactician with a background in construction grammar and corpus analysis (including but not limited to collostructional analysis), and with experience in international (Erasmus+) project management. P4 has participated in the DAAD projects *Credibility, Honesty, Ethics, and Politeness in Academic and Journalistic Writing (CHEP*

2018), and *Conflicting Truths (in Academic and Journalistic Writing, 2019).* Since March 2020, P4 and P6 have participated in the DAAD project *From Uncertainty to Confidence and Trust* (*UnConTrust*). As a member of the international projects *Coordinated Research in the Experimental Morphosyntax of South Slavic Languages Project* (2014-2019) and *Agreement Mismatches in Experimental Syntax: from Slavic to Bantu* (2019-present), supported by the Leverhulme Trust and University College London, P4 has explored the experimental methodology and participated in creating, modifying and conducting experiments. P5 also participated in the aforementioned national project (179013), concentrating, among other things, on visual and multimodal (verbo-visual) manifestations of metaphor and metonymy.

Data usage

The project will contain four work packages: corpus analysis, theoretical elaboration, behavioral experiments, and development of formal routines for usage in AI contexts. Of these, the first and third segment will require data harvesting. The **corpus analysis** will include customary exploration of publicly available (free or commercial) language and multimodal corpora, such as the *Corpus of Contemporary American English* - COCA (for English language data), and the *Corpus of Contemporary Serbian Language* and *Serbian Web Corpus* (for Serbian language data). For access to musical, visual and more broadly multimodal corpora we will obtain materials from usual web repositories (such as complete recordings by selected classical composers or comic strip authors available on YouTube or more broadly online) and collaborate with European and American teams working on similar projects for access to their repositories. Therefore, these are written language materials (e.g. excerpts from phrases, sentences, paragraphs,..) or segments of multimedia presentations (e.g. strip sequences, video clips, short music recordings…) that we shall keep in our databases for project use only, in password-protected folders which are not to be distributed / publicized without the explicit permission of respective copyright holders. We expect these datasets to comprise tens of thousands of words / several hours of multimedia materials.

In terms of **experimental protocols**, the data will include recordings of participants' speech (including transcripts thereof) and digital numerical files containing their responses (e.g. percentage of mistakes, reaction times, suitability judgments along Likert or slider scales). We reasonably expect to gather up to 500 participants total, so that the maximum anticipated amount of data in this phase should include about ten hours of audio recordings, 500 pages of transcripts, and 200 pages of numerical experiment-response data. The plan is, therefore, that the data should be largely obtained *during the implementation of the project*.

All records of the research will be kept private and particular measures will be taken to protect the privacy of participants and data confidentiality. Beforehand, we will also obtain appropriate approvals from the Ethics Committee. In any sort of report we might publish, we will not include any information that will make it possible to identify a participant. Research records will be kept in a locked file, and access will be limited to the researchers, the university bodies responsible for protecting human participants, and regulatory agencies. The audio recordings in particular will be accessible to the project team only, stored in password-protected folders. The data are to be used in a customary way in humanities / social sciences: as resources to write research reports, papers, and prepare conference presentations. We anticipate only negligible costs of data preservation (e.g. storage media, such as DVDs). After the project implementation, the data will remain available to the principal investigator for potential use in subsequent projects. The data from the corpora (but not experimental responses) will be offered to other research groups upon the end of the project for further collaboration / project application opportunities.

Ambition

The project goes beyond the state of the art in concept construction theories in at least three ways: (1) **it combines** the (sometimes mutually confronted) "static" and "dynamic" **approaches** to conceptual structure by using the constructs of the former (e.g. image schemas from cognitive linguistics) as a starting point, yet by equally showing how these constructs dynamically interact with other schematic factors to motivate ultimate concepts (e.g. *paths* and *forces* constructing musical scales, Antović, 2018; the proposal is somewhat reminiscent of "image-schema families", e.g. Hedblom et al 2016, yet it additionally **views schemas as *gradually* and *continuously* evolving in time,** which is **a new approach**, to our knowledge); (2) it strives to identify, theoretically describe, and empirically **verify** such abstract conceptual building blocks **across three cognitive modalities** (language, music, vision),

suggesting that conceptual construction is not reserved for the domain of language alone; rather, the goal is to show that the same abstract principles may operate cross-modally, an issue that is still hotly debated in cognitive science; (3) methodologically, it proposes **research** through all **four pillars of cognitive linguistics** / multimodality studies (corpus analysis, theoretical elaboration, experimental verification, delineation of an AI routine), which is a complex and still comparatively rare strategy, especially in our country; (4) it proposes to formulate its principal results in such a way as to provide **a step forward** in current **AI models** for interpreting complex conceptual structures, such as **metaphors**. For instance, Rai and Chakraverty (2017) assume that metaphoricity is a *gradable* phenomenon. Thus their AI routine classifies expressions as "metaphorical", "non-metaphorical", and *"probably* metaphorical", based on complex computational scenarios. An addition of the schematic component to such a system might help enhance the model. In particular, the detection of a strong schematic structure in an expression which is seen as "probably" metaphorical would help allocate it more confidently to the metaphorical realm. E.g. "red blood" is literal color; "blue blood" a metaphorical statement of someone's noble birth, yet "cold blood" is *probably* metaphorical (suggesting a very calm person, typically criminal, whose blood or more general body temperature may also be literally colder). Adding a *path* topology to the equation enhances the criterion of metaphoricity: "red blood is running" denotes that one is really bleeding; "the look of the sky as the day's blue blood runs out of its cheek" (Stephen King, *Bag of Bones*) is a metaphorical description of a sunset; yet when someone "makes our blood run cold" they are frightening us, which is now a clearly metaphorical usage (physically, being frightened usually puts bodily resources on the alert, so literally our blood is probably hotter in such a scenario). Naturally, much more complex investigation of the corpora would be needed to see if tendencies like these obtain in large numbers of cases, yet if this fourth effort - relating our schematic complexes to established metaphor comprehension AI models - turns out to be successful, we will indeed be talking about a potentially groundbreaking event in the cognitive semantic community.

The significance of the project therefore lies in the fact it paves the way for further progress in the domain of the semantics of concepts, not just in our country. In terms of theoretical innovation, it turns the today classic image schema proposal from cognitive linguistics into a more dynamic construct. Practically, in addition to (1) improving some current metaphor detection AI routines, as described above, potential application branches in several directions: (2) new techniques for teaching conceptual meaning in foreign-language learning contexts (e.g. by helping learners detect, and then generalize from, schematic structures); (3) potential for instruction in rhetorical settings (e.g. raised awareness of the impact of abstract schematic complexes in public speaking); (4) applications in specific cognitive modalities targeted in the project (e.g. new concepts for elementary music / visual instruction with the youngest children or blind / deaf participants). Future extension could branch into many directions: methodologically, we could further test the schematic structures with experimental participants in *neuroscience* settings, as members of larger European and global research consortia (e.g. neuroimaging, event-related potentials); practically, the schematic complexes inferred could be applied to yet more diversified, dynamic cross-modal contexts (sign language, gesture studies, more elaborate multimedia as in presentations combining language, music and video, etc.)

IMPACT

Expected impact

The expected impact of the project equally branches in several directions: in the **scientific *community***, it should help further entrench Serbia on the map of global locations doing high-level cognitive science and cognitive linguistics. This shall continue the tradition we have garnered in the last ten years, among other things in our Center for Cognitive Sciences, the first institution in Serbia dedicated to this multidisciplinary field, which has so far organized three international conferences, given and hosted dozens of talks by renowned international scholars, and participated as a consultant organization in several projects. In terms of **scientific *concepts***, our planned advancement of the notion of schematicism from cognitive linguistics, and its utilization in new, multimodal meaning-generation models (such as the P2's nascent "multi-level grounded semantics", e.g. Antović, 2016 and the ongoing book project for *Routledge*) will have a lasting effect on the cognitive-linguistic and multimedia-studies communities at large, well beyond the borders of our country and region. In that sense, we have already been offered support for our work, also along the lines of this project, by some of the leading international scholars / institutions we have teamed up with before: Prof. Keith Holyoak's Reasoning Lab (UCLA, USA), Janina Wildfeuer of Department of Communication and Information Studies at the University of Groningen, the Netherlands, Prof. Todd

Oakley (chair, Cognitive Science, Case Western Reserve University, USA, formerly president, International Association for Cognitive Semiotics), Prof. Anna Bonifazi (Linguistics, Uni Cologne), Dr. Renee Timmers, Music, Uni Sheffield, Dr. Andrea Schiavio, Music, Uni Graz (president and vice-president, European Society for the Cognitive Sciences of Music). In turn, these would also ensure ***societal* effects** of the highest scale, as they would help profile the city of Niš and Serbia as locations doing top-notch science in the community at large (among other things, through the final project conference we are proposing). In terms of effects on the world outside of core science, we anticipate impact on the **AI - programming - online translation community**, in the sense that our model should provide a small improvement to current metaphor comprehension routines (indeed, trying the machine translation of just about any metaphor shows how much even google is lagging behind in that particular domain). Additionally, effects can be expected for the community of **foreign language teachers** (enhanced schema-based methodology for lexical meaning instruction), **public speakers** (acknowledgement of the importance of schemas for persuasive communication, e.g. in the worlds of media, rhetorics, or politics), **elementary music and visual educators** (the employment of schemas in early, pre-notation instruction, especially with specific groups of participants, e.g. blind or deaf children - cf. Antović, Bennett & Turner, 2013.)

In terms of the theoretical, corpus-analytical, and experimental segment of the project, the target communities are largely scientific, yet quite transdisciplinary: national, regional, and global groups of cognitive scientists, psychologists, linguists, musicologists, researchers of vision or broader multimodality interested in problems of concept acquisition / generation. We assess this amounts to about 50 directly interested people in the country, 200 in the region, and about 1,000 in the world. Adding to the picture the relevant AI-researchers, programmers, language and music teachers, and public speaking experts who could be interested in our findings, the numbers likely multiply by at least five (250 in the country, 1,000 in the region, 5,000 in the world). If some of our proposed schematic routines indeed start to be used in metaphor detection, foreign language, music and visual education, or public speaking settings, the number of (indirect) beneficiaries rises geometrically, in the first wave probably at least tenfold (e.g. children and young adults in public and private English language or music schools, young media presenters or politicians receiving public speaking education). Finally, getting back to the core-scientific value of the project and its indirect relation to the reputation of Niš and Serbian academia - entrenching our group on the map of globally reputable locations to do cognitive linguistics or broader multimedia studies can have a significantly broader impact on our local community at large - as increased visibility of doing top-notch science (especially social science, and even more so the humanities) could both boost the morale of local colleagues in terms of "what is possible" in the apparently peripheral location and improve the reputation of this community for further (scientific) endeavors (indirectly, this applies to all two million people of southeast Serbia). This, along with prospective future applications utilizing our model in more international settings (e.g. major consortia sponsored by programs such as Horizon 2020), would in turn comprise the main longer-term impact of the project.

Dissemination of results

Results of research within each work package will, for the most part, be presented in the customary form of **papers** and **conference presentations**. We anticipate a total of at least **ten papers** and **ten presentations** for the project (of which we expect one half to be published / presented during the three years of implementation, and one more half within two years after the implementation phase). Given the project team's strong international profile, the targeted dissemination venues will also be international: journals with impact factors / edited volumes by reputable publishers (e.g. OUP, Springer, Routledge,..) and conferences of respected international professional associations (e.g. International Association for Cognitive Semiotics, European Society for the Cognitive Sciences of Music, European Society for the Study of English…). While such international targeting may sound ambitious for Serbian academics in the humanities, we stress that we already take pride in a plethora of high ranking international publications: e.g. PI in *Culture, Cognition, Discourse and Grammar* (Peter Lang), the journal *Pragmatics* (IPrA) (to appear in 30:4, 2020), *Voprosy Yazykoznanija* (Russian Academy of Sciences), P1 in the highest-level M21a journal *Psychological Bulletin* and M21 *Journal of Memory and Language* (the highest such achievement by Serbian academics from applicable fields, to our knowledge), P2 in M21 journals such as *Language and Communication* and *Metaphor and Symbol* and edited volumes with OUP, De Gruyter, or John Benjamins (about 20 recognized international publications so far, including an ongoing individual book project for *Routledge*), P3 in *Review of Cognitive Linguistics* (2019) and the *International Journal of Corpus Linguistics* (to appear in 25:3, 2020), P4 in the highest-level M21 journal *Frontiers in Psychology*, and *Glossa: A Journal of General Linguistics*. In terms of conferences, our current total experience comprises well over 100 presentations at international research events, of which the P2 alone has had over 30, across Europe and the United States, including numerous invited talks (e.g.

CWRU, Freiburg, Cologne, Frankfurt, Sheffield, Vienna, Navarra, Brno, Thessaloniki, Sofia, and other locations). Thus, we reasonably expect that most in-project conference presentations should also be highly internationally profiled: indeed, we anticipate at least two keynote lectures presenting the results of this project, too.

As for additional dissemination venues, in year three, we plan to organize **the final project conference** in Niš, open to national and international non-project participants, to present project results and secure sustainability (networking, discussing potentials for follow-up research, etc.). We have ample experience in organizing such international events, e.g. three conferences in the Center for Cognitive Sciences, hosting such top names as Keith Holyoak, Ray Jackendoff, and Mark Turner, yearly conferences on language and literature in the Faculty of Philosophy, Niš, the conference *SinFonIJA* (Syntax, Phonology, and Language Analysis) etc.

To ensure broader availability of the results, the project budget will allocate funds for open access publications in reputable journals. In addition, we will be maintaining the **project website** where the main information on our activities and results will be available. Finally, we will inform key national and international stakeholders, in particular relevant international research groups from our current and future networks, on project milestones by means of **mailing lists.** Informal presentations at **popular science festivals** (such as e.g. the well known Serbian yearly event "Nauk nije bauk" [Science is not a Scarecrow]) go without saying. Finally, if project results should look interesting for the public at large in the final phase, we will organize **media appearances** (e.g. a press conference, appearances in dedicated live TV and radio programs). Needless to say, the support of the Serbian Science Fund will be highlighted throughout.

IMPLEMENTATION PLAN

Credentials of PI and members of Project team

As stressed above, the main strong points of the PI and team members relate to their **abundant international experience**, including **serious theoretical, analytical and experimental work** which has resulted in **publications in top-notch journals and edited volumes, invited and regular presentations at high-level international conferences across the fields** (e.g. cognitive, generative and psycholinguistics, cognitive semiotics, music cognition, multimedia studies, creativity studies, social anthropology,...), **establishment of scientific organizations** "from scratch" which have by now acquired solid international reputation (e.g. the Center for Cognitive Sciences, Laboratory for Language and Cognition), **top-level international contacts**, **organization of high-profile international events** (e.g. conferences on multimodal communication, and symbol grounding in the Center for Cognitive Sciences), and finally **participation in national and international research projects** (three major national projects funded by the Serbian Ministry of Science, two DAAD projects, one Leverhulme trust project, one TEMPUS and one Erasmus+ project, two Fulbright scholarships, an institute for advanced studies fellowship, a Humboldt fellowship for senior researchers), as shown, for instance, on P2's website. In terms of the more narrowly scientific output, the biographies of senior team members (PI - P6) include over twenty publications in refereed international journals and edited volumes and over fifty presentations at international conferences abroad.

In terms of the complementarity of the team, under the umbrella of cognitive science, the project interlinks cognitive and formal linguistics, music and visual cognition, spanning theoretical, corpus, and experimental methodologies. This provides a perfect setting for the synergistic activity of all team members. PI has recently worked on formulaic language, including semantic aspects of idiomatic expressions in English and Serbian and morphosemantic models of compounds. P1 has worked on metaphor theory, including the psycholinguistic aspects of its comprehension (in highly published empirical and theoretical work taking individual-differences approach as its basis), and its application to multimodal contexts, mostly related to visual cognition, such as video games and comics. P2 is the head of the Center for Cognitive Sciences at the University of Niš, with ample experience in both theoretical and experimental research in domains of both formal and cognitive linguistics, recently mostly conceptual and cognitive semantics, with a strong transdisciplinary focus on connections with music, religious, poetic cognition, and more broadly multimodality studies. Schematicity has been his long term interest in all these projects (e.g. in music cognition), sometimes as part of his broader focus on metaphor. Most recently he has worked on incorporating cognitive schemas into a broader theory of multimodal meaning construction known as "multilevel-grounded semantics" (a programmatic article here; this is also the main topic of the book that he is currently writing for

Routledge, entitled "Multilevel Grounding: A Theory of Musical Meaning"). P3 has recently published internationally in cognitive linguistics, on massive corpora and colostructions (in press, *International Journal of Corpus Linguistics*). P4 has recent well-published articles in the formal linguistics of gender agreement and the language of media persuasion. P5 has worked on semantic effects in comics, P6 on morphosemantic approaches to the Serbian lexicon, P7 on the psycholinguistics of metaphor clusters and metaphor identification. P8 and P9 are young researchers interested mostly in schematicity and conceptual blending in multimedia contexts (video games, TV shows).

In short, we have experts on cognitive science as related to metaphor in language, music, religion and poetry; visual multimedia and analogy theory; the morphosemantics of idiomatic constructions in English and Serbian; corpus based cognitive linguistics; cognitive linguistics as applied to comics; formal linguistics as also applied to media persuasion; Serbian lexicology; the psycholinguistics of metaphor. This in itself points at good possibilities for collaboration in the framework of a contrastive (Serbian-English) project on schematicity and metaphor in language and beyond. In fact, collaborations in directions similar to this project have so far included, for instance, the joint work of P1, P2 and P7 on musical meaning construction, P1 and P2 on the schematic bases of idioms, P1 and P5 on metaphoricity in comics, P1, P3, and P5 on prototypicality in motion verbs, P1 and P6 on modal verbs in English and Serbian, etc. These will now naturally continue, and in a much more systematic fashion, in the present project.

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