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Elena-Mădălina Vătămănescu, Andreia Gabriela Andrei, Florina Pînzaru,

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# Investigating the online social network development through the Five Cs Model of Similarity

## The Facebook case

Elena-Mădălina Vătămanescu

*Faculty of Management,*

*National University of Political Studies and Public Administration,  
Bucharest, Romania*

Andreia Gabriela Andrei

*Interdisciplinary Research Department of Social Sciences and Humanities,  
Alexandru Ioan Cuza University of Iași, Iași, Romania, and*

Florina Pinzaru

*Faculty of Management,*

*National University of Political Studies and Public Administration,  
Bucharest, Romania*

### Abstract

**Purpose** – The purpose of this paper is to explore the influence of five dimensions of similarity (i.e. condition similarity, context similarity, catalyst similarity, consequence similarity and connection similarity) on Facebook social networks development.

**Design/methodology/approach** – A questionnaire-based survey was conducted with 245 Romanian college students. SmartPLS 3 statistical software for partial least squares structural equation modeling was chosen as the most adequate technique for the assessment of models with both composites and reflective constructs.

**Findings** – More than 52 percent of the variance in social network development was explained by the advanced similarity model. Each dimension had a positive effect on Facebook social networks development, the highest influences being exerted by condition similarity, context similarity and consequence similarity.

**Research limitations/implications** – The current approach is substantively based on the homophily paradigm in explaining social network development. Future research would benefit from comparing and contrasting complementary theories (e.g. the rational self-interest paradigm, the social exchange or dependency theories) with the current findings. Also, the research is tributary to a convenience-based sample of Romanian college students which limits the generalization of the results to other cultural contexts and, thus, invites further research initiatives to test the model in different settings.

**Social implications** – Similarity attributes and mechanisms consistently determine the dynamics of online social networks, a fact which should be investigated in depth in terms of the impact of new technologies among young people.

**Originality/value** – This study is among the first research initiatives to approach similarity structures and processes within an integrative framework and to conduct the empirical analysis beyond US-centric samples.

**Keywords** Information society, Partial least squares, Human computer interaction (HCI), Social network analysis, Facebook, Model of similarity, Social networks development

**Paper type** Research paper

### Introduction

In a highly digital world, the extensive information technologies (ITs) have shifted social relationships out of localized contexts and have dramatically reconfigured the way individuals create and develop their social networks. As IT and social landscape become inseparable, individuals' self-conceptions and behavioral patterns have been pervasively challenged, giving way to "new concepts that embrace social-technological intertwinement," and to derivative implications for people and communities (Carter and Grover, 2015, p. 391).



It follows that new constructs and correlations are needed to interpret the dynamics of human behavior and, thus, the patterns of social networks development.

In this front, both seminal and recent literature have posited that a milestone in the study of social networks is to explore and understand the interplay between similarity and social ties (Montoya *et al.*, 2008; Mackinnon *et al.*, 2011; Zhao *et al.*, 2012; Zubcsek *et al.*, 2014; Dunbar *et al.*, 2015; Bahns *et al.*, 2016, etc.). The overarching assumption is that similarity plays a very important role as it stands for the linchpin of relationships initiation and formation (Bahns *et al.*, 2016), and at the same time, it is a propelling factor for online social networks development, be they offline or online (Crandall *et al.*, 2008; Lewis and Wimmer, 2010).

Given the wide array of definitions and research directions on social network development, hereinafter, we will refer to it pursuant to Collin *et al.*'s (2011) dimensions, namely, strengthening and building communities over time, strengthening existing relationships, reinforcing sense of belonging and collective identity, developing new relationships, creating convergence of online and offline spaces. These dimensions are in accordance with Scott's (2000) parameters of social network development, namely: size, intensity (i.e. an indicator of the relationship strength and closeness to a social network), durability (i.e. the activation degree of a social relationship), density (i.e. the level of interconnectedness within a social network) and dispersion (i.e. indicator of the existence of various social groups within a network, e.g. from both online and offline environments).

Even though similarity is deemed to play a key role in achieving a better awareness of the interaction and communication patterns defining peers relationships in social networks, few studies have approached it within integrative and interdisciplinary frameworks, as Gehlbach *et al.* (2016, p. 343) clearly stated: "as compelling and robust as the similarity-relationship research is, important scientific and applied gaps plague our understanding of these associations." Moreover, the authors underline that their study is the first experimental investigation addressing actual similarities as a means to developing ongoing relationships and, thus, "striving to contribute to the scientific theories linking similarity and relationships" (Gehlbach *et al.*, 2016, p. 343). Likewise, Mackinnon *et al.* (2011) claimed the same research gap, affirming that "though it is well-documented that people are more likely to be in relationships with similar others, scant research has examined how this general tendency plays out in day-to-day social situations." In this respect, the authors urge that this phenomenon has "profound implications worthy of further pursuit" (p. 880).

Placing the aforementioned relationships in the context of Facebook online social networks (i.e. the object of the current study), Cheung *et al.* (2011, p. 1337) observe that "despite the importance of online social networks, there is relatively little theory-driven empirical research available to address this new type of communication and interaction phenomena," adding that "understanding why students use online social networking sites is crucial for the academic community." This perspective is also assumed by Brooks *et al.* (2014, p. 1) who stress that "it is surprising that so little work has been done relating social capital to social structure as captured by social network site (SNS) friendship networks." The same or similar research gaps in the correlative investigation of similarity and the development of online social networks have emerged in other research papers, among which we mention: Montoya *et al.* (2008), Crandall *et al.* (2008), Lewis and Wimmer (2010), Mackinnon *et al.* (2011), Kisilevich *et al.* (2012), Zhao *et al.* (2012), Zubcsek *et al.* (2014), Dunbar *et al.* (2015), Bahns *et al.* (2016).

Some of the aforementioned studies draw upon a particular research gap which is yet unsolved, that is, the debate on the influence of similarity on different phases of relationship formation and, thus, of social network development. While some authors support the idea that "similarity should exist among friends at the outset – playing a central role in the earliest stages of friendship initiation [...], it should add nothing further to relationship

development” (Bahns *et al.*, 2016, p. 336), others posit that “people rapidly become more similar shortly before their first communication and continue to become more similar for a long time afterward” (Crandall *et al.*, 2008, p. 8) and that there are multiple social mechanisms and homophily functions which should be accounted for social network development, in general and for Facebook, in particular (Lewis and Wimmer, 2010).

Most of these contributions are built up on the homophily theory on social network development, as a paramount setting for similarity assessment (Katz *et al.*, 2004). Katz *et al.* (2004) underscore that homophily stands for the tendency of individuals to associate with similar ones, nodes’ similarity affecting the formation of relationships between nodes. In other words, homophily refers to the principle that “birds of a feather flock together” and has been examined across a wide array of settings, characteristics and relationships, according to McPherson *et al.* (2001) and Lewis and Wimmer (2010). Given the fact that the homophily mechanism applies to any attribute that peers may share – from socio-demographic categorization to online selection of new friends, we find this perspective as a fruitful point of reference for further investigation.

The approach is consistent with the research problem raised by Lewis and Wimmer (2010, p. 625) that future work should focus on “disentangling various homogeneity-producing mechanisms” with a view to achieving “a proper understanding and estimation of any form of homophily in any social network.” Accordingly, it is from this cardinal point that the present paper intends to elaborate on different attributes and mechanisms of similarity within online social networks and to propose an exploratory research in this sense.

Assuming the theoretical and empirical knowledge gaps along with the debate on similarity capitalization depending on the phase of relationships and social network development, the current research endeavor strives to advance an integrative framework for the underlying processes depicting the dynamics of online social networks. This would mark an important step forward toward an encompassing perspective on relationship formation and development that coagulates a wide range of attributes and levels of homophily and, thus, similarity. Further, by means of a correlative perspective on various similarity properties and drivers, the research is meant to provide a pertinent answer to Lewis and Wimmer’s (2010) challenge, that is, to clarify different types of homophilies which can reinforce each other and engender a cumulative and intricate influence on social network patterns of development.

In line with Davison’s (2014) suggestions, the research is also intended to bring about a phenomenological contribution, in that the sample context of Romanian participants is relatively novel. As the student population is representative for Generation Y and as most of the studies regarding the Generation Y have been undergone in the USA (Pinzaru *et al.*, 2016), a Romanian context-centric approach was intended to provide further phenomenological insights. Even though a recent study (Petre and Săvulescu, 2015) concluded that Romanian youngsters feel very similar to their peers from all over the world, there are elements “specific to the local context that influence the way these youngsters think and act” (Pinzaru *et al.*, 2016, p. 175). For example, after conducting a large-scale research with over 3,000 participants, Pinzaru *et al.* (2016) conclude that one of the most important factors that put a gap between the Romanian and Western countries youngsters resides in the lag of ITs use. This lag, however, bolstered them toward the intensive, even addictive, use of the IT, in general, and of online social networks, in particular. The derivative claim is that “one significant difference between Romanian Generation Y and the people belonging to the same generation who live in other countries is that they are lazy and prefer to spend all their time with their friends, online or offline” (Pinzaru *et al.*, 2016, p. 179), consistently seeking for a good exposure by means of online social interactions.

That being the case, the paper was structured in three main sections. First, as the proposed conceptual model builds on and reinterprets prior perspectives in the field, a

systematic literature review was conducted (as presented in the Literature review section). The methodological guidelines of the systematic literature review as well as the description of each dimension and inferred hypothesis are thoroughly discussed as founding elements of the conceptual model named by the authors as the Five Cs Model of Similarity. Second, the methodological design of the research is depicted, stressing on the measurement model and structural model assessments by employing a structural equation modeling (SEM) technique based on partial least squares (PLS). Third, the results and discussion sections bring forward the hypotheses testing and validation, highlighting the similarity proper within Facebook online social networks.

## Literature review

### *Methodological aspects of the systematic literature review*

As the proposed conceptual model builds on and reinterprets prior perspectives in the field, a systematic literature review was conducted. The elaboration of the systematic literature review followed the main coordinates set by Schryen (2015, p. 289), that is, the establishment of the focus (i.e. topic and domain), outcome (i.e. the reorganization and reinterpretation of previous theoretical approaches), framing (i.e. the systematization of a conceptual review) and phases development (i.e. search and assessment, synthesis and interpretation).

In terms of focus, the topic of the systematic review was “similarity in social network development,” addressed from an interdisciplinary perspective straddling five main research domains: psychology, sociology (implicitly, social psychology), communication, information science and information systems. The consideration of all these fields was supported by the fact that the similarity construct is ontologically placed at the crossroads of psychology, sociology and communication while social network development, especially the online social networks facilitated by Facebook, have at least a threefold input, namely, social psychology, information systems and information science.

Our goal was to create a conceptual framework which fully considers both offline and online social worlds as prerequisites of online social networks composition in response to Ellison *et al.*'s (2007) concern that “it is unclear how social capital formation occurs when online and offline connections are closely coupled, as with Facebook” (p. 1147). Given that different analyses have elaborated on the online-offline dialectics (e.g. Ellison *et al.*, 2007; Brooks *et al.*, 2014; Dunbar *et al.*, 2015) or on factor-centric similarity mechanisms (as pointed by Lewis and Wimmer, 2010), the imperative to review the extant literature on the topic of similarity in social network (development) set itself up as a research thrust acknowledged as such by multiple studies (Montoya *et al.*, 2008; Mackinnon *et al.*, 2011; Zhao *et al.*, 2012; Zubcsek *et al.*, 2014; Dunbar *et al.*, 2015; Bahns *et al.*, 2016). We thus embraced an encompassing perspective which ranged from Dunbar *et al.*'s (2015) findings that the structure of the online social networks mirrors those in the offline world, reinforcing existing offline relationships rather than availing exclusively online ties (Ellison *et al.*, 2007) to Goggins *et al.*'s (2011) vision on completely online group formation and development.

This being the case, the overarching outcome of conducting the present literature review was meant to respond to the creation of new knowledge by re-viewing research lines and angles, by classifying and making sense of varied conceptual pieces within an integrative and broader framework, by designing an array of coherent macro-concepts (Webster and Watson, 2002; Biolchini *et al.*, 2005; Rowe, 2014; Schryen, 2015; Watson, 2015). The pivotal point resided in “the discovery of gaps in knowledge that are important for research explorations with a theory-building focus” (Wolfswinkel *et al.*, 2013, p. 47), by challenging the horizon of current literacy in the field and by availing a fresh frame of reference. In this front, the literature review outcome envisaged the advancement of a multi-construct-based framework, meant to propose an original outlook of the topic on both conceptual and methodological grounds.

Adding to knowledge accumulation and acquisition at the crossroads of different fields (Webster and Watson, 2002, p. xv), the specific objectives of the systematic literature review were: to develop a conceptual model of similarity in social networks development by reinterpreting and integrating prior research; to operationalize the conceptual model as to serve as the lynchpin of a measurement and structural model; and to put forward a research agenda embedded in the psycho-sociological phenomena within online social networks.

In accordance with Webster and Watson's (2002, p. xv) guidelines, we defined the literature review's scope and boundaries as follows: first, the existence of multi-layered similarity in the context of Facebook social networks was inferred; second, certain boundaries were set: the literature review should draw on interdisciplinary studies emerged from concurrent perspectives (social psychology, communication, information systems and information science); the literature review should first focus on articles published in top-ranked journals indexed in Web of Science; the literature review should primarily consider studies on peers relationships in the context of social network development; and the literature review should prioritize Facebook-centric studies, as a topical reference context for college students' online social networks and as an instructive environment in terms of increased social contact via the "friending" mechanism (as advanced by Killworth *et al.*, 2006; Ellison *et al.*, 2007; Lewis and West, 2009; Lewis and Wimmer, 2010; Cheung *et al.*, 2011; Brooks *et al.*, 2014; Bohn *et al.*, 2014).

As our searches for comprehensive literature reviews on the topic – in the Web of Science database – did not retrieve pertinent results, a starting point for accessing relevant sources was the consideration of renowned academic journals focused on psycho-sociological mechanisms of relationship formation, reinforcement and development and on social networks dynamics. The underlying assumption was that the corresponding reference sections would point to a wider literature pool comprising both topical research and seminal works in the field.

The primary filter of selection was the publication's declared topic, focus and scope and the publication ranking in Web of Science – 22 relevant journals were identified (see Table A1). Pursuant to Wolfswinkel *et al.* (2013, p. 48), after a preliminary skimming into the table of contents, we then defined logical search strings – applied to titles and abstracts – by introducing keywords and phrases in the search field of each selected journal, respectively, "similarity," "homophily," "Facebook social network," "similarity in social networks," "homophily in social networks." The period of the search was customized between 2010 and 2016 in order to concentrate on recent contributions.

After this preliminary phase, 71 articles were retrieved. They formed the basis of further queries in line with Webster and Watson's (2002, p. xvi) guidelines: "Go backward by reviewing the citations for the articles identified [...] to determine prior articles you should consider. Go forward [...] to identify articles citing the key articles identified." The backward process leads to the identification of eight seminal books while the forward process brought about four papers presented at renowned international conferences and to six more articles indexed in Web of Science (suggested on the journals' websites as "related articles"). We considered the search completed when new articles only introduced redundant arguments and viewpoints.

On purpose to ensure consistency in the literature assessment phase, two out of the four authors have conducted the analysis after defining specific screening criteria including both article quality and fit. The agreed formal quality requirements referred to the availability of extensive literature reviews covering similarity-based constructs (i.e. social similarity, homophily, peers relationships) in the context of social networks. Data and methodology requirements were deemed of secondary relevance. At this level, a pilot test on the first ten selected sources was applied in order to ensure an inter-coder reliability check (Schryen, 2015).

The application of the boundaries along with the assessment of the identified literature adequacy leads to the exclusion of 16 articles, after reading the corresponding abstracts (most of the excluded papers did not conform to the study of peers-centric relationships, but to societal bonds in general). Finally, 55 articles, four conference papers and eight books were found relevant and adequate to underpin the literature synthesis or, as Levy and Ellis (2006, p. 200) posited, “to assemble the literature being re-viewed for a given concept into a whole that exceeds the sum of its parts.” It is also in this line that the next step unfolded – the interpretation phase – which aimed at the advancement and adoption of a new concept-centric perspective (see Table AII).

After a preliminary classification and interpretation of the heterogeneous theoretical pieces in broader conceptual categories, five main approaches on similarity attributes and mechanisms in the framework of social networks emerged, starting from similarity in socio-demographic structures, personality traits, values, interests, preferences, hobbies, continuing with context-driven similarity via availability, opportunity, propinquity, with potency-driven similarity via balancing effects (reciprocity and triadic closure), social influence-generated similarity via sociality, social interaction and validation and ending with online-centric similarity via exclusive online befriending. In order to pertinently capture the scope and focus of each dimension, we termed the five factors as: condition similarity, context similarity, catalyst similarity, consequence similarity and connection similarity. These dimensions are indicative of the intricate psycho-sociological interaction processes which support and cement social network development, in general, and of Facebook social networks, in particular. Moreover, we deem that the five-factor solution substantially fits together the general scope of similarity attributes and mechanisms in social networks and, at the same time, the distinctiveness of each dimension.

#### *The Five Cs Model of Similarity and hypotheses development*

The present section brings to the fore the theoretical pillars of the advanced conceptual model, as resulted from the systematic literature review, that is, condition similarity, the context similarity, the catalyst similarity, the consequence similarity and connection similarity. The presumed relationships among these constructs and social network development are subsequently formulated.

*Condition similarity.* In the present taxonomy, condition similarity refers to the a priori multifold resemblances between or among different individuals, including key attributes as socio-demographic variables (e.g. age, gender, social status, economic background, hometown, income level), personality traits, values, interests, preferences, hobbies, cultural and personal tastes, etc. (McPherson *et al.*, 2001; Katz *et al.*, 2004; Lewis and Wimmer, 2010; Mackinnon *et al.*, 2011; Bahns *et al.*, 2016). Guy *et al.* (2010) and Myers (2015) underline that being interested in the same things triggers a high level of influence on people, while Smith and Giraud-Carrier (2012) and Bahns *et al.* (2016) stress on the opportunity of networks to highlight affinities, or inherent similarities among people as a prerequisite of strengthening relationships.

Placed in the context of social networks, condition similarity is objectivized in the phase of relationships initiation when the homophily tendency prevails in the social aggregation of individuals with similar socio-demographic characteristics (Mackinnon *et al.*, 2011; Bahns *et al.*, 2016). For example, when examining the level of homophily among American students whose parents had similar incomes and education degrees, Mayer and Puller (2008) found a significant relationship between these variables and the composition of Facebook social networks.

Analyzing how the interaction of similarity and status can produce strong effects, Anderson *et al.* (2012) and Myers (2015) demonstrated that similarity in the characteristics of

two individuals can affect the evaluation one person provides of another. They posit that “we can predict outcomes simply from the statuses and similarities of the users who show up to provide evaluations” (Anderson *et al.*, 2012). This standpoint was previously assumed by Zeggelink (1995) who suggested that preferences for similar peers have prominent effects on friendship formation and enhancement. The researcher laid emphasis on “how individual characteristics and preferences (individual attributes at the micro level) with respect to prospective friendship relations interact and aggregate to outcomes at the macro level: the network structure” (p. 83).

Similarities of opinions, interpersonal styles, communication skills, demographics and values have all been shown in experiments to increase liking and to sustain fruitful interaction (Batson *et al.*, 2005, p. 18). Further, a research conducted by Newcomb on college roommates revealed that people sharing similar backgrounds, academic achievements, political values and views are more likely to develop strong friendships (Newcomb, 1963, p. 382). In their own right, phenotypic and trait similarities promote cognitions of oneness, or the inclusion of other in the self, which also entail interdependent relations (Smith *et al.*, 1999, p. 878; Myers, 2015). Even a perceived incidental similarity with another person can lead to increased compliance – any request is “more appealing when delivered by someone with whom we share a birthday, a first name, or fingerprint similarities” (Burger *et al.*, 2004, p. 41).

In this vein, giving credit to Lewis and Wimmer (2010) that socio-demographic structures should be considered exogenous predictors of friendship development as they “influence the tie formation process and thus overall network composition” (p. 592) and, at the same time, that there are “indirect effects through which socio-demographic structures influence the tie formation process and thus overall network composition” (p. 591), we assume the existence of both direct and indirect effects of condition similarity on social network development: Therefore, we infer that:

*H1.* Condition similarity has a significant positive influence on social network development, both direct (a) and indirect effects (b).

*Context similarity.* The second dimension of the conceptual model – context similarity – refers to the reinforcement of resemblances between or among individuals due to the propinquity, availability and opportunity effects. This approach is indicative of Fischer *et al.*'s (1977, p. 46) seminal theory that the social origins of associations (e.g. propinquity based on cohabitation – shared workplace, shared neighborhood) are influenced by the nature and extent of similarity (e.g. work associates are especially socio-economically similar). This confirms the tendency for various socially segregated settings to constrain choices to sets of people who are homogeneous at multiple levels (i.e. availability).

More specifically, Crandall *et al.* (2008) draw upon the fact that encounter opportunities are determined by relatively immutable factors such as income, education level and residence. The aforementioned perspective is also assumed by Barnes *et al.* (2014), Heaney (2014) and Leifeld and Schneider (2012) who stress that homophily and, implicitly, the multi-faceted similarity among individuals is a prerequisite of context-specific social aggregations and, thus, for interaction opportunities.

Other recent studies support these findings in that “similarity guides niche construction when people identify potential friends based on pre-existing similarities,” propinquity, opportunity and the structure of the social world bridging similar individuals (Bahns *et al.*, 2016, p. 336). This fact is also stemmed from the investigation of Lewis and Wimmer (2010, p. 592), according to which “members of the same social category may find themselves [...] in the same social spaces – pursuing certain activities rather than others, choosing certain professional career paths and not others, or living in a particular neighborhood or region.”



In other words, context similarity is structurally pre-programmed to a great extent, social homogeneity guiding the social structuring of activities within limited sets of available alternatives (Feld, 1981; Mollenhorst *et al.*, 2008; Lewis and Wimmer, 2010; Vătămănescu *et al.*, 2015, 2017; Bahns *et al.*, 2016). Such attributes configure the availability and opportunity patterns of social relationships as they channel individuals into certain social pools or specific environments.

Based on these theoretical premises, we infer that:

*H2.* Condition similarity has a significant positive effect on context similarity.

In this light, the perspective on similarity as a context points out how social structures in the form of foci of activity organize the selection and sorting processes as a prerequisite of social network development. Foci is defined as “social, psychological, legal or physical objects around which joint activities are organized” (Feld, 1981, p. 1016) and they may be formal (e.g. college, work arrangements) or informal (e.g. regular hangout, family or peers cohorts), large (e.g. community) or small (e.g. household). Herein, researchers demonstrate that people are more likely to interact with the ones they encounter in the same church, school or workplace (Crandall *et al.*, 2008; Leifeld and Schneider, 2012; Brooks *et al.*, 2014; Bahns *et al.*, 2016).

The influence of shared foci on social network development is highlighted in Mollenhorst *et al.*'s (2014, p. 5) findings illustrating that “meeting opportunities in specific social contexts, such as the work place, family, sports clubs, voluntary associations, and the neighborhood” explain the consistency of social bonds relationships formation and, thus, of social network development. This is synthesized in Crandall *et al.*'s (2008) statement that “people become aware of others through shared, recent activity around artifacts” and in Mackinnon *et al.*'s (2011) viewpoint that interaction generated by proximity propels the relationship formation and development.

Transferring the discussion to the context of Facebook social network composition and development, Lewis and Wimmer (2010) deem opportunity structures (i.e. shared foci effects) as a crucial aspect for network development among college students. In this respect, Brooks *et al.* (2014) describe Facebook as an encompassing example for investigating the network structure and development all the more so as Facebook networks tend to be large, dense and indicative of many offline foci (e.g. coworkers, friends from high school). By taking the analysis further, Snijders *et al.* (2013) and Heaney (2014) mentioned the emergence of multiplex social networks deriving from the intertwining of various social worlds objectivized by means of various foci. Here, social and spatial propinquity is even credited with a predictive value in terms of social network development as individuals who are close to each other in context-driven social environments are prone to affiliate with and underpin the same social network (Lerman *et al.*, 2012; Vătămănescu *et al.*, 2015).

Pursuant to the aforementioned research directions, we presume that:

*H3.* Context similarity has a significant positive influence on social network development.

*Catalyst similarity.* The perspective on similarity as a catalyst is based on the similarity-attraction paradigm which posits that people like and are attracted to others who are or are expected to be similar (Byrne, 1971; Morry, 2007) and on the baseline principle that “likeness begets liking” (Myers, 2015, p. 330). In this vein, a high level of perceived similarity in terms of socio-demographic characteristics (either based on actual traits or on artificially inflated evaluations) is liable to reinforce the belief that others are substantially alike (Montoya *et al.*, 2008; Myers, 2015; Gehlbach *et al.*, 2016). Perceived similarity along various dimensions – lifestyle, social, economic, cultural, religious backgrounds, hobbies, etc. – leads toward the validation of one’s “sense of relatedness” (Gehlbach *et al.*, 2016, p. 342), to the potency of friendship mechanisms and pro-social behavior (Rubinstein and Salant, 2016;

Vătămănescu *et al.*, 2016) and, finally, to social contagion (Harrigan *et al.*, 2012). All these social processes extend the boundaries of homophilous foundations and, thus, of condition similarity through amplification effects (Goodreau *et al.*, 2009; Lewis and Wimmer, 2010; Vătămănescu, 2012).

Starting from these considerations, we presume that:

*H4.* Condition similarity has a significant positive influence on catalyst similarity.

In the framework of Heider's (1958) balance theory, if two individuals are friends, they are expected to share similar evaluations of an object. As Katz *et al.* (2004) mention, throughout the years, the theoretical model has been extrapolated to encompass a third person in the social network as the object of reference. In this respect, "if the two individuals did not consistently evaluate the third person, they would experience a state of discomfort and would strive to reduce this cognitive inconsistency by altering their evaluations of either the third person or their own friendship" (p. 316). This being the case, individuals are somehow channeled to like to befriend their friends' friends with a view to preserving symmetry in social relations. In support of these arguments, Montoya *et al.* (2008, p. 282) urge that the most influential factors for predicting interpersonal attraction emerge from the core assumption that "their partners are similar, regardless of whether the partner is actually similar to them."

Focusing on the context of Facebook social networks development, Lewis and Wimmer (2010, p. 585) stated that "more recent empirical research suggests that the effects of homophily on relationship development are also amplified by balancing mechanisms, according to which social networks to display 'a high degree of reciprocity' – the increased tendency (in directed networks) for A to be friends with B if B is already friends with A – as well as a high degree of transitivity brought about by triadic closure – the tendency for friends-of-friends to become friends" (p. 591). Their findings clearly indicate that these potentiating drivers are "by far the most important principles of relationship formation," of social network composition and development in the case of college students, suggesting it would be worthwhile for the social network scholarship to explore the catalyst influence of these processes in much more detail.

Building on this logic, we infer that:

*H5.* Catalyst similarity has a significant positive influence on social network development.

*Consequence similarity.* In the taxonomy of the five-factor model, the perspective on similarity as a consequence designates the homophily effects in terms of guiding social judgment and action (Rubinstein and Salant, 2016). The core assumption is consistent with Crandall *et al.*'s (2008) findings that similarity along socio-demographic characteristics leads to interaction, but then interaction and sociability between peers result in further similarity. This is descriptive of the process of social influence which bolsters individuals toward imitating and exhibiting similar attitudes and behaviors within a social network (Crandall *et al.*, 2008; Cheng and Grün, 2015). The social influence perspective underscores that new forms of similarity may develop over time as a result of interpersonal learning, accommodation and consistent influence, people gradually becoming more similar to their peers at multiple levels (Bahns *et al.*, 2016).

In order to cement the membership status, individuals tend to align with the social network's norms and values, progressively developing additional similar ways of thinking and acting (Yoo and Alavi, 2001; Vătămănescu *et al.*, 2015; Bahns *et al.*, 2016). Burger *et al.* (2001) reveal the consolidation of the similarity tiers among the individuals as a consequence of a substantive perception of similar attributes. Interacting with similar ones, for example, provides confirmation that a person is not alone in his or her belief, supports one's core identity and opens a predictive window into the others' behavioral propensity (Myers, 2015).

To put this in simple terms, “as an individual interacts with similar others, he reaps positive reinforcement in the form of validation” (Gehlbach *et al.*, 2016, p. 342).

At this level, as Skinner (1953) and Ashford *et al.* (2001) concluded, a certain behavior is assumed when providing a consequence an individual finds rewarding. The keystone of the Skinnerian perspective is positive reinforcement, which stresses that behavior to be changed by the influence of attractive consequences. In Skinner’s system, goals, rewards and incentives are considered to be positive reinforcers as the achievement of a goal or receiving the reward is likely to guide or motivate the actions of other people (Skinner, 1953). Thus, when the question “why do people behave as they do?” emerges, the answer goes “because they are reinforced for it.”

This approach finds confirmation in recent studies, as well, Mackinnon *et al.* (2011) and Bahns *et al.* (2016) urging that the emergence of fluent, rewarding and congenial relationships relies on seeking and acknowledging pre-existing similarity (i.e. condition similarity), which is likely to reinforce the patterns and consistency of their social worlds. On this account, Lazega *et al.* (2012, p. 323) explore the effect of normative homophily, arguing that individuals within a certain network “use similarities with others in ascribed, achieved or inherited characteristics, as well as other kinds of ties, to mitigate the potentially negative effects of this strong status rule.”

Based on these considerations, we infer that:

*H6.* Condition similarity has a significant positive influence on consequence similarity.

Framing their empirical research in the context of Facebook social networks, Lewis and Wimmer (2010) consider social influence as a causal determinant of social network composition and development. They set cultural tastes as the unit of analysis (e.g. music, movies and books) and highlight that tie formation and social network development are influenced by the degree of sociality among peers.

This overarching perspective is also present in Cheung *et al.*’s (2011) contribution which supports the impact of social influence on the capitalization of Facebook social networks among student groups. Similarly, de Klepper *et al.* (2010, p. 82) tint the overall image, arguing that “in a setting where social collaboration is crucial and friendship choices are more constrained, influence might be the main reason for similarity found among friends,” and thus, it may account for a specific layer of similarity in the development of social networks. In other words, the higher the social influence, the higher the degree of generated similarity among members and, consequently, the higher the extent of social network development.

Building on the aforementioned research directions, we presume that:

*H7.* Consequence similarity has a significant positive effect on social network development.

*Connection similarity.* The final dimension of the conceptual model – connection similarity – assumes the advent and development of the new ITs, with a focus on online social networks, which boost individuals’ “connective exchanges by joining like-minded groups [...], sharing information and by networking in order to meet new people and make new friends” (Panteli and Marder, 2016). The inclusion of this dimension is in line with Brooks *et al.*’s (2014, p. 1) perspective on social capital extension based on computer-mediated communication and on their claim that “little work has been done relating social capital to social structure as captured by social network site (SNS) Friendship networks.”

Furthermore, the advancement of online social networks has substantially reframed the way relationships are formed and developed within virtual social aggregations (Castells, 2009; Westaby, 2012; Segev *et al.*, 2015; Palacios-Marqués *et al.*, 2015; Vătămănescu *et al.*, 2017). As Westaby (2012, p. vii) posits “New advances across the social sciences are highlighting social networks as phenomena that can motivate people and change lives,” while Castells (2009, p. 120)

speaks about the peers' opportunity to build up new cultural worlds projecting their values, preferences and interests.

Against this background, connection similarity is illustrative of people opportunity to interact with other similar ones from different social worlds and to create online their own social environment (Kim *et al.*, 2010; Bohn *et al.*, 2014; Zubcsek *et al.*, 2014). In this point, Bahns *et al.* (2016, p. 331) posit that "an important pathway to niche construction is selecting friends who share one's attitudes, values, personality traits, and interests." This is consistent with Panteli and Marder's (2016) findings – contextualized in the case of social networking sites – according to which individuals have "a preference to be with people of the same age as them as they shared similar interests and lifestyles," the tendency to develop connections with like-minded peers online being probative in this respect.

Based on these considerations, we presume that:

*H8.* Condition similarity has a significant positive influence on connection similarity.

From a bird's eye view, the online settings have facilitated the exchange and sharing of similar ideas, preferences, values among individuals beyond space constraints (Goggins *et al.*, 2011; Andrei and Zaiț, 2014; Carter and Grover, 2015; Vătămănescu *et al.*, 2016; Andrei *et al.*, 2017) and have confirmed that "web infrastructure can be critical for knowledge sharing and the formation of virtual teams" (Popa *et al.*, 2016, p. 118). Placing further the discussion in the context of Facebook social networks, Ellison *et al.* (2007) conclude that internet supplements strong ties and favors new connections "in that it provides people with an alternative way to connect with others who share their interests or relational goals" (p. 1147). Thus, by means of consistent communication and interaction processes, Facebook supports the exploration and strengthening of new interpersonal relationships across the globe and from all walks of life (Broadfoot, 2010; Vătămănescu, 2012; Hansen *et al.*, 2015; Vătămănescu *et al.*, 2016). This triggers the increase of individuals' social capital and forms the basis of social network development (Walther *et al.*, 2009; Kisilevich *et al.*, 2012; Zhao *et al.*, 2012; Carter and Grover, 2015).

Starting from these premises, we infer that:

*H9.* Connection similarity has a significant positive influence on social network development.

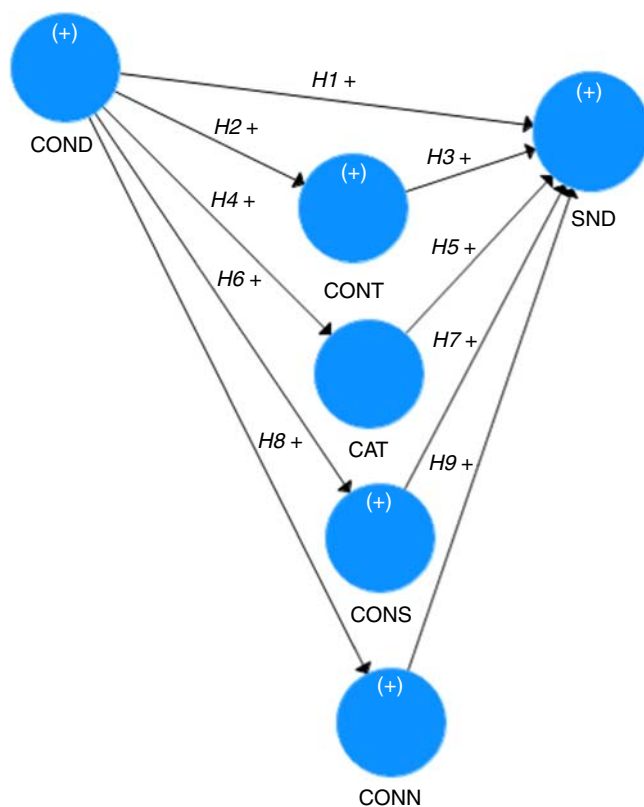
By corroborating the aforementioned relationships, we advance a research model which assumes the influence of the five dimensions of similarity on social network development, as outlined in Figure 1.

## Material and method

### Sample

Given the popularity of Facebook as an online social networking site among a wide range of demographic categories, especially among cohorts of college students (Harrigan *et al.*, 2012), the research model was tested with students from two top universities in Romania ( $n = 245$ ). Pursuant to Davison's (2014) perspective on the contextual importance as a growing concern within the IS field, the convenience-based sample was presumed culturally valuable in terms of extending research on social networks outside of samples from the USA.

Therefore, a total of 300 Romanian students were invited to participate in the study. In order to ensure a pertinent degree of sample consistency, two filter variables were used so that only subjects who had over 300 friends and spent on Facebook more than two hours a day were selected for further pursuit. Consequently, 245 Romanian students (aged between 20 and 22 years,  $M = 21$  years, 156 females and 89 males) were finally considered.



**Figure 1.**  
Proposed research model with hypotheses

The adequacy of the sample size ( $n = 245$ ) was supported by the results of an a priori power analysis performed with G\*Power 3.1.9.2 software (Faul *et al.*, 2007, 2009) which required a minimum of 138 participants for detecting a moderate effect at 95 percent power in a five-factor model estimated with 0.05 error probability.

*Method and procedure*

The current research relies on a questionnaire-based survey conducted in November 2016. The questionnaires comprised 22 items and were administered during four lectures delivered within the two universities. The average duration of the questionnaire completion was established at 15 minutes in a pre-test carried out with seven students.

The questionnaire focused on gathering participants' insights on the similarity mechanisms in the context of Facebook online social networks, but they also included Facebook usage-related facts such as the number of Facebook friends, friends' age, gender and residence, the rapport between the known and unknown friends.

In order to shorten the completion duration as much as possible, and to achieve a higher degree of objectivity in categorizing the insights collected from the participants, the questionnaires included 22 items relating to the different facets of the similarity construct and social network development. All these 22 items were based on response alternatives constructed as five-point Likert scales, varying from 1 (to a very small extent) to 5 (to a very great extent) and investigated respondents' approach and attitudes toward the patterns of the online interaction.

*Measures*

The advanced measures followed the theoretical developments resulted from the systematic literature review and were grouped according to the five dimensions of similarity and to the social network development construct, as presented in the conceptual model and detailed in Table I.

As previously validated measures were not consistent with the scope and the focus of the present research and they would not have substantially support its integrative nature, the research instrument was developed by authors, using qualitative research in a first stage. In this regard, an interview-based pilot study was conducted with 14 participants to pre-validate the dimensions depicted from the literature review and to develop the corresponding items. A total of 30 items were initially developed, considering five items for each of the six constructs, namely, the social network development and the five dimensions of similarity. Only 22 items were kept (see Table I) as a result of a closed card-sorting pre-test showing that only these 22 cards were correctly assigned by participants to the six given categories (dimensions). The card-sorting pre-test was conducted with 20 participants

| Dimensions                       | Indicators | Items   |
|----------------------------------|------------|---|
| Condition similarity (COND)      | COND1      | Most of my Facebook friends have the same goals in life   |
|                                  | COND2      | Most of my Facebook friends are of the same age with me   |
|                                  | COND3      | Most of my Facebook friends spend similar amounts of money for going out  |
|                                  | COND4      | Most of my Facebook friends have similar hobbies and preferences  |
| Context similarity (CONT)        | CONT1      | I met most of my Facebook friends when attending ordinary activities (e.g. high school, college, hobbies, etc.)                               |
|                                  | CONT2      | I mostly communicate on Facebook with peers who have similar offline arrangements (e.g. college, work, hangouts schedules, etc.)              |
|                                  | CONT3      | Whenever I meet like-minded peers during face-to-face interactions, I send them friendship requests on Facebook                               |
| Catalyst similarity (CAT)        | CAT1       | In most cases, I also become friend on Facebook with my friend's friends  |
|                                  | CAT2       | I believe that my friend's friends have things in common with me  |
|                                  | CAT3       | If my new friends on Facebook are willing to communicate with me, I usually get involved in the discussion                                    |
| Consequence similarity (CONS)    | CONS1      | I usually discuss with my Facebook friends when I need an opinion or advice   |
|                                  | CONS2      | I am usually open to my Facebook friends' new suggestions and recommendation regarding good music, films, books, etc.                         |
|                                  | CONS3      | Whenever my Facebook friends agree with me on different comments, I enjoy being part of the group   |
|                                  | CONS4      | If most of my Facebook friends share the same opinion, I tend to pay more attention to their point of view                                    |
| Connection similarity (CONN)     | CONN1      | I enjoy using Facebook recommendation systems to find people with similar profiles  |
|                                  | CONN2      | I enjoy getting in touch on Facebook with new people sharing my interests   |
|                                  | CONN3      | I usually send friendship requests on Facebook to people I meet online when performing different activities (e.g. games, blogs, forums, etc.) |
| Social network development (SND) | SND1       | My Facebook network has become larger over time (SIZE DIMENSION)  |
|                                  | SND2       | I feel that the relationships with my Facebook peers have become closer and stronger over time (INTENSITY DIMENSION)                          |
|                                  | SND3       | I constantly share online new things with most of my Facebook friends (DURABILITY DIMENSION)  |
|                                  | SND4       | I often feel that my Facebook network is like a big family (DENSITY DIMENSION)  |
|                                  | SND5       | I enjoy expanding my Facebook network with people I like, from both offline and online interactions (DISPERSION DIMENSION)                    |

**Table I.**  
Measured dimensions  
and indicators

in the Autumn of 2016, with one user at a time, in a face-to-face interaction (25 minutes on average per participant).

Therefore, four reflective constructs (i.e. catalyst similarity, consequence similarity, connection similarity and social network development) and two composite constructs (i.e. condition similarity and context similarity) were developed to be tested via SEM. The composite nature of the latter was determined by the inclusion of indicators which accounted in aggregate for the overall dimension and allowed modeling causal relationships within their nomological net (e.g. condition similarity was derived from age, socio-economic status, goal, hobbies and preferences similarities while context similarity resulted from the simultaneous consideration of propinquity, availability and opportunity structures).

#### *Research technique using partial least squares structural equation modeling (PLS-SEM)*

SmartPLS 3 (Ringle *et al.*, 2015) statistical software for PLS-SEM was used to analyze similarity dimensions as determinants of social network development. PLS-SEM was chosen as a unique method for both measurement model validation and structural model analysis, as it allows statistical assessment of models mixing composite and reflective constructs (Henseler *et al.*, 2016).

As previously depicted, the conceptual model (Figure 1) and the assumed relationships (*H1-H9*) between the six variables considered (four reflective constructs and two composites) were analyzed using the data collected from the 245 participants in the study.

Since the PLS-SEM rule of thumb advanced by Barclay *et al.* (1995) would require 50 entries as a minimum sample size for testing our model, and the power analysis (Faul *et al.*, 2007, 2009) would require 138 participants for detecting moderate effect at 95 percent power for estimating our five-factor model with 0.05 error probability, we considered the actual sample size ( $n = 245$ ) appropriate for deriving accurate results via PLS procedure.

### **Analysis of the PLS-SEM results**

#### *Measurement model evaluation*

Considering the extant requirements for the use of PLS-SEM (Ringle *et al.*, 2012; Hair, Sarstedt, Pieper and Ringle, 2012; Hair, Sarstedt, Ringle and Mena, 2012; Hair *et al.*, 2014; Henseler *et al.*, 2016), the overall goodness of fit (GoF) and the measurement model evaluation are reported before the structural relationships analysis.

The value of the standardized root mean squared residual indicator (SRMR = 0.073, lower than the 0.08 limit of Hu and Bentler, 1999), as well as the detailed results presented in Table II illustrate that the overall model has a good fit (GoF) and the measurement model complies with all requirements of validity and reliability ( $\alpha > 0.7$ ;  $\rho_A > 0.7$ ; CR > 0.8; AVE > 0.5).

Further, Henseler *et al.*'s (2015) heterotrait-monotrait ratio of correlations HTMT.85 criterion (Table III) and Fornell and Larcker's (1981) criterion (Table IV) confirm the discriminant validity, while the values of variance inflation factor (VIF) show no collinearity

| Construct and items         | $\alpha$ | rho_A | CR    | AVE   |
|-----------------------------|----------|-------|-------|-------|
| COND (composite construct)  | na       | 1.000 | na    | na    |
| CONT (composite construct)  | na       | 1.000 | na    | na    |
| CAT (reflective construct)  | 0.704    | 0.710 | 0.835 | 0.627 |
| CONS (reflective construct) | 0.712    | 0.714 | 0.822 | 0.536 |
| CONN (reflective construct) | 0.703    | 0.720 | 0.832 | 0.624 |
| SND (reflective construct)  | 0.818    | 0.819 | 0.873 | 0.579 |

**Table II.**  
Measurement model:  
construct reliability  
and convergent  
validity

among items and no collinearity among constructs (VIF values between 1.0 and 1.8) complying to the rule of  $VIF < 3.3$  indicated in Diamantopoulos and Siguaw (2006). In aggregate, the results support that all the measurement evaluation criteria are satisfied.

Detailed results from Table II are showing that the measurement model complies with all requirements of validity and reliability ( $\alpha > 0.7$ ;  $\rho_A > 0.7$ ; composite reliability  $CR > 0.8$ ;  $AVE > 0.5$ ).

### Measurement and structural model evaluation

In order to test the assumed relationships between the similarity dimensions and social networking development, we analyzed the variances (i.e.  $R^2$  and adjusted  $R^2$ ) and the model path coefficients ( $\beta$ ), as well as the effects significance and observed effect sizes ( $f^2$ ) according with the PLS modeling standards (Ringle *et al.*, 2012; Hair, Sarstedt, Pieper and Ringle, 2012; Hair, Sarstedt, Ringle and Mena, 2012; Hair *et al.*, 2014; Henseler *et al.*, 2016) of using the PLS algorithm and bootstrapping procedure for structural model assessment.

As outlined in Figure 2, Tables V and VI, the results of the structural model analysis indicate that all five dimensions of similarity positively influence social network development.

Supporting the influence of all five similarity dimensions on online social network development, the findings show that almost 52 percent of the variance of SND ( $R^2 = 0.522$ ) is explained by the proposed model. The SND endogenous variable is influenced by each of the five similarity dimensions, either directly or indirectly, as detailed in Table VI.

The exogenous variable COND exerts large or medium-size effects (Cohen, 1988) on the other four similarity dimensions (CONT, CAT, CONS, CONN), determining 27 percent of the variance of CONT ( $R^2 = 0.271$ ; large effect size  $f^2 = 0.372$ ), 20 percent of the variance of CAT ( $R^2 = 0.201$ ; medium effect size  $f^2 = 0.251$ ), 13.6 percent of the variance of CONS ( $R^2 = 0.136$ ; medium effect size  $f^2 = 0.158$ ) and 15.2 percent of the variance of CONN ( $R^2 = 0.152$  medium effect size  $f^2 = 0.179$ ).

First, the structural model analysis confirmed *H2*, *H4*, *H6* and *H8*, indicating positive relationships between condition similarity and each of the other four dimensions of similarity, as follows: *H2* (COND→CONT:  $\beta = 0.521$ ,  $t = 9.035$ ,  $p < 0.001$ ;  $f^2 = 0.372$ ), *H4* (COND→CAT:  $\beta = 0.448$ ,  $t = 8.254$ ,  $p < 0.001$ ;  $f^2 = 0.251$ ), *H6* (COND→CONS:  $\beta = 0.369$ ,  $t = 6.176$ ,  $p < 0.001$ ;  $f^2 = 0.158$ ) and *H8* (COND→CONN:  $\beta = 0.389$ ,  $t = 6.217$ ,  $p < 0.001$ ;  $f^2 = 0.179$ ).

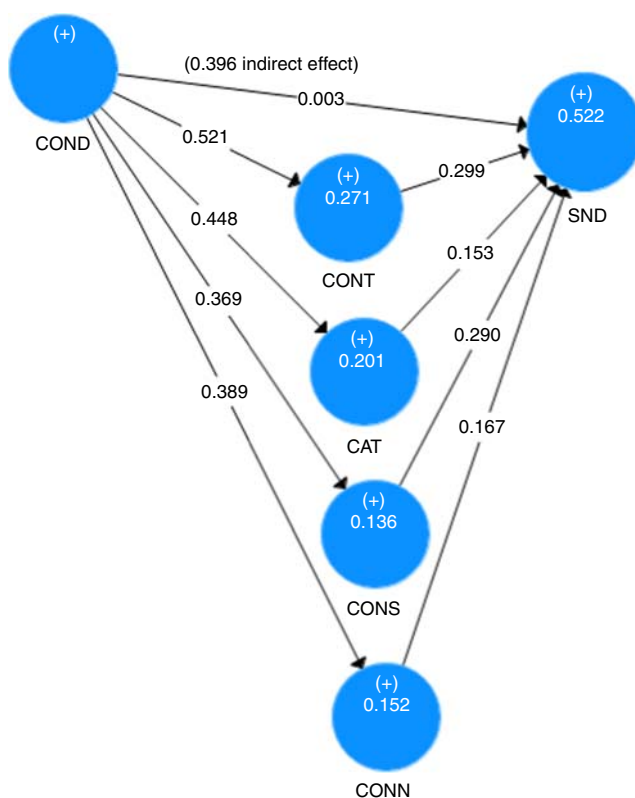
**Table III.**  
Discriminant validity:  
HTMT.85 criterion

| Construct | CAT   | CONN  | CONS  | SND |
|-----------|-------|-------|-------|-----|
| CAT       |       |       |       |     |
| CONN      | 0.739 |       |       |     |
| CONS      | 0.734 | 0.562 |       |     |
| SND       | 0.711 | 0.653 | 0.777 |     |

**Table IV.**  
Discriminant validity:  
Fornell-Larcker  
criterion

| Construct | CAT   | COND  | CONN  | CONS  | CONT  | SND   |
|-----------|-------|-------|-------|-------|-------|-------|
| CAT       | 0.792 |       |       |       |       |       |
| COND      | 0.448 | na    |       |       |       |       |
| CONN      | 0.524 | 0.389 | 0.790 |       |       |       |
| CONS      | 0.521 | 0.369 | 0.411 | 0.732 |       |       |
| CONT      | 0.508 | 0.521 | 0.452 | 0.522 | na    |       |
| SND       | 0.545 | 0.399 | 0.502 | 0.596 | 0.605 | 0.761 |





**Figure 2.**  
Structural model

| Construct | Coefficient of determination ( $R^2$ ) | Adjusted $R^2$ |
|-----------|--|----------------|
| CAT       | 0.201                                  | 0.198          |
| CONN      | 0.152                                  | 0.148          |
| CONS      | 0.136                                  | 0.133          |
| CONT      | 0.271                                  | 0.268          |
| SND       | 0.522                                  | 0.512          |

**Table V.**  
Structural model:  $R^2$

Second, the analysis provided probative results (Table VI) in support of *H3*, *H5*, *H7* and *H9* that assumed the direct positive effects exerted on social network development by context similarity, catalyst similarity, consequence similarity and connection similarity: *H3* (CONT→SND:  $\beta = 0.299$ ,  $t = 3.769$ ,  $p < 0.001$ ;  $f^2 = 0.104$ ), *H5* (CAT→SND:  $\beta = 0.153$ ,  $t = 2.139$ ,  $p < 0.05$ ;  $f^2 = 0.027$ ), *H7* (CONS→SND:  $\beta = 0.290$ ,  $t = 4.314$ ,  $p < 0.001$ ;  $f^2 = 0.111$ ) and *H9* (CONN→SND:  $\beta = 0.167$ ,  $t = 2.594$ ,  $p < 0.05$ ;  $f^2 = 0.038$ ).

Although no statistical significance was found in the positive direct relationship between the exogenous variable COND and the endogenous variable SND ( $\beta = 0.003$ , ns; *H1a* is rejected), the positive indirect effect of COND on SND ( $\beta = 0.396$ ,  $t = 8.237$ ,  $p < 0.001$ ; *H1b* is supported) denotes the significance of the assumed positive influence of condition similarity on social network development (COND→SND total effect:  $\beta = 0.399$ ,  $t = 6.247$ ,  $p < 0.001$ ), partially confirming *H1*.

**Table VI.**  
Structural model:  
direct and indirect  
effects

| Effects                    | $\beta$ | Mean  | SE    | $T$   | $p$   | CI 2.5% | CI 97.5% | CI 2.5% Bias Corr | CI 97.5% Bias Corr | Bias Corr | $f^2$ | Hypotheses            |
|----------------------------|---------|-------|-------|-------|-------|---------|----------|-------------------|--------------------|-----------|-------|-----------------------|
| COND → SND total effect    | 0.399   | 0.409 | 0.064 | 6.247 | 0.000 | 0.276   | 0.529    | 0.256             | 0.529              | 0.506     | –     | H1 – partly supported |
| COND → SND direct effect   | 0.003   | 0.006 | 0.063 | 0.044 | 0.965 | –0.111  | 0.132    | –0.119            | 0.132              | 0.124     | 0.000 | H1a – not supported   |
| COND → SND indirect effect | 0.396   | 0.404 | 0.048 | 8.237 | 0.000 | 0.308   | 0.500    | 0.296             | 0.500              | 0.484     | –     | H1b – supported       |
| COND → CONT                | 0.521   | 0.528 | 0.058 | 9.035 | 0.000 | 0.404   | 0.631    | 0.368             | 0.631              | 0.610     | 0.372 | H2 – supported        |
| CONT → SND                 | 0.299   | 0.297 | 0.079 | 3.769 | 0.000 | 0.137   | 0.448    | 0.137             | 0.448              | 0.447     | 0.104 | H3 – supported        |
| COND → CAT                 | 0.448   | 0.455 | 0.054 | 8.254 | 0.000 | 0.340   | 0.557    | 0.316             | 0.557              | 0.538     | 0.251 | H4 – supported        |
| CAT → SND                  | 0.153   | 0.151 | 0.071 | 2.139 | 0.032 | 0.009   | 0.291    | 0.011             | 0.291              | 0.292     | 0.027 | H5 – supported        |
| COND → CONS                | 0.369   | 0.380 | 0.060 | 6.176 | 0.000 | 0.261   | 0.494    | 0.231             | 0.494              | 0.470     | 0.158 | H6 – supported        |
| CONS → SND                 | 0.290   | 0.293 | 0.067 | 4.314 | 0.000 | 0.159   | 0.420    | 0.149             | 0.420              | 0.411     | 0.111 | H7 – supported        |
| COND → CONN                | 0.389   | 0.397 | 0.063 | 6.217 | 0.000 | 0.270   | 0.512    | 0.245             | 0.512              | 0.498     | 0.179 | H8 – supported        |
| CONN → SND                 | 0.167   | 0.168 | 0.064 | 2.594 | 0.010 | 0.046   | 0.295    | 0.045             | 0.295              | 0.294     | 0.038 | H9 – supported        |

Finally, the values of the confidence intervals (95% CI out of zero) resulted from the 5,000 re-samples bootstrapping procedure (Table VI) confirmed the significance of model relationships as indicated by Henseler *et al.* (2016) and provided statistical evidence in support of all research hypotheses (excepting *H1a*), indicating that each similarity dimension has a significant positive effect on social network development.

In the end, we controlled for potential differences between males (89 participants) and females (156 participants), using gender as grouping variable in a between groups analysis performed via PLS-MGA. The results detailed in Table VII indicated no significant differences on structural model parameters between genders, as observable from the non-significant *p*-values for effect differences in females (*g1*) vs males group (*g2*).

Other controls were introduced in the study via participant selection and filtering: Romanian students from top universities, aged between 20 and 22 years, *M* = 21 years, spending on Facebook more than two hours a day and having over 300 Facebook friends.

## Discussion and conclusions

### Summary of the results

The investigation of the Five Cs Model of Similarity within Facebook online social networks brought to the fore the attributes and mechanisms of similarity in the framework of social network development. At this level, the data analysis validated the main inferred relationships of the research in the case of Romanian college students – more than half of the variance of social network development is explained by the advanced model comprising condition similarity, context similarity, catalyst similarity, consequence similarity and connection similarity.

The first research hypothesis considering the positive effect of condition similarity on social network development was partially supported in the context of the Romanian-based sample. While the direct effect is non-significant, the indirect and total effects are validated, stressing that similarity in terms of age, socio-economic backgrounds, goals, hobbies, preferences influences social network development by means of various social mechanisms (i.e. contexts, catalysts, consequences, connections). In this vein, 52.2 percent of the variance in social network development is explained by the advanced model. The results are in line with Lewis and Wimmer's (2010, p. 591) findings in the case of American students which indicate that socio-demographic structures indirectly influence the overall network composition of Facebook.

The same situation is objectivized in the case of the influence of condition similarity on context similarity (*H2*) and further on social network development (*H3*). Among the endogenous variables in the model, condition similarity has the highest influence on context similarity ( $\beta = 0.521$ ,  $t = 9.035$ ,  $p < 0.001$ ;  $f^2 = 0.372$ ) and, then, context similarity has the highest influence on social network development ( $\beta = 0.299$ ,  $t = 3.769$ ,  $p < 0.001$ ;  $f^2 = 0.104$ ),

**Table VII.**  
PLS-MGA multi-group  
analysis for effects  
differences between  
males (*g2*) and  
females (*g1*)

| Effects     | Effects ( <i>g1</i> ) | Effects ( <i>g2</i> ) | Effects-diff ( <i>g1</i> – <i>g2</i> ) | <i>p</i> -Value ( <i>g1</i> vs <i>g2</i> ) |
|-------------|-----------------------|-----------------------|--|--|
| COND → SND  | 0.375                 | 0.520                 | 0.145                                  | 0.894                                      |
| COND → CONT | 0.512                 | 0.622                 | 0.109                                  | 0.866                                      |
| CONT → SND  | 0.294                 | 0.285                 | 0.009                                  | 0.471                                      |
| COND → CAT  | 0.425                 | 0.491                 | 0.066                                  | 0.727                                      |
| CAT → SND   | 0.159                 | 0.171                 | 0.012                                  | 0.542                                      |
| COND → CONS | 0.349                 | 0.486                 | 0.137                                  | 0.892                                      |
| CONS → SND  | 0.299                 | 0.253                 | 0.046                                  | 0.383                                      |
| COND → CONN | 0.408                 | 0.374                 | 0.034                                  | 0.400                                      |
| CONN → SND  | 0.233                 | 0.118                 | 0.115                                  | 0.198                                      |

indicating that similarity in terms of age, socio-economic backgrounds, goals, hobbies, preferences influences individuals' propinquity, availability and opportunity to meet to the greatest extent ( $R^2 = 0.271$ ). The result – which is indicative of the Romanian sample – supports the findings reported for US-based samples in that propinquity is one of the most important drivers of relationship formation on Facebook (Lewis and Wimmer, 2010; Brooks *et al.*, 2014).

Focusing on the influences between condition similarity and catalyst similarity ( $H4$ ,  $R^2 = 0.201$ ;  $\beta = 0.448$ ,  $t = 8.254$ ,  $p < 0.001$ ;  $f^2 = 0.251$ ) and, further, on social network development ( $H5$ ,  $\beta = 0.153$ ,  $t = 2.139$ ,  $p < 0.05$ ;  $f^2 = 0.027$ ), both inferred relationships are supported. Nevertheless, the influences and effects are lower than in the case of context similarity. In this particular point, the insights provided by the Romanian-based sample contrast the ones from the US-centric sample analyzed by Lewis and Wimmer (2010) according to which the two balancing mechanisms (reciprocity and triadic closure) are even more important than propinquity. In other words, the development of Facebook social networks by Romanian college students does not rely mainly on reciprocating friendships or on befriending their friends' friends and, thus, the presumed (perceived) similarity between cohorts has not the same impact as for American students.

Though lower than in the case of context similarity, the positive influences of condition similarity on consequence similarity ( $H6$ ,  $R^2 = 0.136$ ;  $\beta = 0.369$ ,  $t = 6.176$ ,  $p < 0.001$ ;  $f^2 = 0.158$ ) and of consequence similarity on social network development ( $H7$ ,  $\beta = 0.290$ ,  $t = 4.314$ ,  $p < 0.001$ ;  $f^2 = 0.111$ ) are also supported in the context of Romanian cohorts of college students. The findings are in line with Crandall *et al.*'s (2008), Cheung *et al.*'s (2011), Lazega *et al.*'s (2012) and Rubinstein and Salant's (2016) considerations on social influence and normative homophily and their relevant impact on social network development.

The analysis of the relationships between condition similarity and connection similarity ( $H8$ ,  $R^2 = 0.152$ ;  $\beta = 0.389$ ,  $t = 6.217$ ,  $p < 0.001$ ;  $f^2 = 0.179$ ) and of connection similarity on social network development ( $H9$ ,  $\beta = 0.167$ ,  $t = 2.594$ ,  $p < 0.05$ ;  $f^2 = 0.038$ ) confirms the positive influences between constructs. Although Romanian college students engage in connective exchanges with like-minded peers, the online-based mechanism to form new relationships is weaker than the corresponding offline processes, as indicated in the studies of Ellison *et al.* (2007), Mayer and Puller (2008) and Lewis and Wimmer (2010). This is why the findings are indicative of the high value of offline social arrangements in engendering Facebook social networks beyond contextual delimitations. Consequently, the findings support that the social mechanisms which are decisive for offline social networks development are translated to online settings to a large extent.

#### *Research contributions and implications*

By corroborating the aforementioned findings, the study adds to the extant literature in several ways.

First, the theoretical and empirical research responds to the claims of recent studies that new insights on the social-technological intertwinement are needed to pertinently capture the dynamics of social relationships in the framework Facebook online social networks development (as underlined by Mackinnon *et al.*, 2011; Brooks *et al.*, 2014; Carter and Grover, 2015; Gehlbach *et al.*, 2016 among others). In this respect, the advancement of a systematic literature review and exploratory research on the interplay between similarity proper and social network development may be considered as a step forward.

Second, the conceptual model and similarity constructs were developed by the authors, as standardized research instruments on the topic are not yet available.

Third, a sample of Romanian college students – active users of Facebook – was employed. This choice availed us of the opportunity to compare and contrast it against existing literature that mainly focuses on a US-centric sample. The contribution could be,

thus, treated as empirical and phenomenological in that the sample context of Romanian participants is relatively novel and invites further context-specific studies to either supplement or supplant the findings.

Fourth, the study integrates the inputs of both offline and online social worlds in Facebook social networks development, laying emphasis on their substantial interplay in today's highly digital environment. Hereby, our goal was to foreshadow the similarity-driven social network development as an encompassing framework able to enhance the understanding of various social phenomena captured in the information systems literature.

#### *Limitations and future research directions*

As any other research, our study has several limitations and would benefit from further improvements.

On the one hand, the current approach is substantively based on the homophily paradigm in explaining social network development. In this front, future research would benefit from comparing and contrasting complementary theories (e.g. the rational self-interest or mutual and collective interest paradigms, the social exchange or dependency theories, etc.) with the current insights and findings.

On the other hand, the research developed in the present paper has an exploratory nature meant to test effects and explain variances. This is why future studies are welcomed to use it as a proxy for further analyses within confirmatory or predictive frameworks.

Finally, the research is tributary to a convenience-based sample of Romanian college students which limits the generalization of the empirical results to other cultural contexts. In this regard, the extension of the research sample or the shift of its focus on other populations (other cultures, for instance) or age categories (middle-aged people, for instance) would further validate the predictive value of the model beyond age and cultural delimitations.

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### Further reading

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### Appendix

| No. | Publication name (alphabetical order)                       | Rank and category in Web of Science Journal Citation Report (2015)         | No. of articles |
|-----|---|--|-----------------|
| 1.  | <i>American Journal of Sociology</i>                        | Q1-7/142 (Sociology)   | 2               |
| 2.  | <i>Annual Review of Sociology</i>                           | Q1-1/142 (Sociology)   | 1               |
| 3.  | <i>Basic and Applied Social Psychology</i>                  | Q3-36/62 (Psychology, Social)  | 1               |
| 4.  | <i>Communication Research</i>                               | Q1-11/79 (Communication)   | 1               |
| 5.  | <i>Computers in Human Behavior</i>                          | Q1-21/129 (Psychology, Multidisciplinary)                                  | 1               |
| 6.  | <i>Information Systems Journal</i>                          | Q1-34/144 (Computer Science, Information Systems)                          | 7               |
| 7.  | <i>Information Systems Management</i>                       | Q3-84/144 (Computer Science, Information Systems)                          | 1               |
| 8.  | <i>Information Technology and People</i>                    | Q2-33/86 (Information Science & Library Science)                           | 2               |
| 9.  | <i>Journal of Abnormal and Social Psychology</i>            | Q1-8/129 (Psychology, Multidisciplinary)                                   | 1               |
| 10. | <i>Journal of Computer-Mediated Communication</i>           | Q1-1/79 (Communication), Q1-3/86 (Information Science and Library Science) | 3               |
| 11. | <i>Journal of Educational Psychology</i>                    | Q1-5/57 (Psychology, Social)   | 1               |
| 12. | <i>Journal of Personality and Social Psychology</i>         | Q1-3/62 (Psychology, Social)   | 1               |
| 13. | <i>Journal of Social and Personal Relationships</i>         | Q1-18/79 (Communication)   | 3               |
| 14. | <i>Judgment and Decision Making</i>                         | Q2-40/129 (Psychology, Multidisciplinary)                                  | 1               |
| 15. | <i>Knowledge and Information Systems</i>                    | Q2-41/144 (Computer Science, Information Systems)                          | 2               |
| 16. | <i>MIS Quarterly</i>  | Q1-1/86 (Information Science and Library Science)                          | 4               |
|     |   | Q1-2/144 (Computer Science, Information Systems)                           |                 |
| 17. | <i>New Media and Society</i>                                | Q1-2/79 (Communication)  | 2               |
| 18. | <i>Personality and Social Psychology Bulletin</i>           | Q1-10/62 (Psychology, Social)  | 4               |
| 19. | <i>Program — Electronic Library and Information Systems</i> | Q3-87/144 (Computer Science, Information Systems)                          | 1               |
| 20. | <i>Small Group Research</i>                                 | Q3-46/62 (Psychology, Social)  | 1               |
| 21. | <i>Social Networks</i>                                      | Q1-5/142 (Sociology)   | 14              |
| 22. | <i>Sociological Methods and Research</i>                    | Q1-3/142 (Sociology)   | 1               |

**Table AI.**

Relevant journals for the research theme (with the exception of methodological articles and Romanian context-specific articles)

| Authors (chronological order)         | Condition similarity | Context similarity | Catalyst similarity | Consequence similarity | Connection similarity |
|---------------------------------------|----------------------|--------------------|---------------------|------------------------|-----------------------|
| Skinner (1953)                        |                      |                    |                     | X                      |                       |
| Heider (1958)                         |                      |                    | X                   |                        |                       |
| Newcomb (1963)                        | X                    |                    |                     |                        |                       |
| Byrne (1971)                          |                      |                    | X                   |                        |                       |
| Fischer <i>et al.</i> (1977)          |                      | X                  |                     |                        |                       |
| Feld (1981)                           |                      | X                  |                     |                        |                       |
| Zeggelink (1995)                      | X                    |                    |                     |                        |                       |
| Smith <i>et al.</i> (1999)            | X                    |                    |                     |                        |                       |
| Ashford <i>et al.</i> (2001)          |                      |                    |                     | X                      |                       |
| Burger <i>et al.</i> (2001)           |                      |                    |                     | X                      |                       |
| McPherson <i>et al.</i> (2001)        | X                    |                    |                     |                        |                       |
| Yoo and Alavi (2001)                  |                      |                    |                     | X                      |                       |
| Burger <i>et al.</i> (2004)           | X                    |                    |                     |                        |                       |
| Katz <i>et al.</i> (2004)             | X                    |                    | X                   |                        |                       |
| Batson <i>et al.</i> (2005)           | X                    |                    |                     |                        |                       |
| Morry (2007)                          |                      |                    | X                   |                        |                       |
| Crandall <i>et al.</i> (2008)         |                      | X                  |                     | X                      |                       |
| Mollenhorst <i>et al.</i> (2008)      |                      | X                  |                     |                        |                       |
| Montoya <i>et al.</i> (2008)          |                      |                    | X                   |                        |                       |
| Castells (2009)                       |                      |                    |                     |                        | X                     |
| Goodreau <i>et al.</i> (2009)         |                      |                    | X                   |                        |                       |
| Walther <i>et al.</i> (2009)          |                      |                    |                     |                        | X                     |
| Broadfoot (2010)                      |                      |                    |                     |                        | X                     |
| Cheung <i>et al.</i> (2011)           |                      |                    |                     | X                      |                       |
| Goggins <i>et al.</i> (2011)          |                      |                    |                     |                        | X                     |
| Kim <i>et al.</i> (2010)              |                      |                    |                     |                        | X                     |
| de Klepper <i>et al.</i> (2010)       |                      |                    |                     | X                      |                       |
| Lewis and Wimmer (2010)               | X                    | X                  | X                   |                        | X                     |
| Mackinnone <i>al.</i> (2011)          | X                    |                    |                     | X                      |                       |
| Anderson <i>et al.</i> (2012)         | X                    |                    |                     |                        |                       |
| Kisilevich <i>et al.</i> (2012)       |                      |                    |                     |                        | X                     |
| Lazega <i>et al.</i> (2012)           |                      |                    |                     | X                      |                       |
| Leifeld and Schneider (2012)          |                      | X                  |                     |                        |                       |
| Lerman <i>et al.</i> (2012)           |                      | X                  |                     |                        |                       |
| Vătămănescu (2012)                    |                      |                    | X                   |                        |                       |
| Westaby (2012)                        |                      |                    |                     |                        | X                     |
| Zhao <i>et al.</i> (2012)             |                      |                    |                     |                        | X                     |
| Snijders <i>et al.</i> (2013)         |                      | X                  |                     |                        |                       |
| Barnes <i>et al.</i> (2014)           |                      | X                  |                     |                        |                       |
| Bohn <i>et al.</i> (2014)             |                      |                    |                     |                        | X                     |
| Brooks <i>et al.</i> (2014)           |                      | X                  |                     |                        | X                     |
| Heaney (2014)                         |                      | X                  |                     |                        |                       |
| Mollenhorst <i>et al.</i> (2014)      |                      | X                  |                     |                        |                       |
| Zubcsek <i>et al.</i> (2014)          |                      |                    |                     |                        | X                     |
| Carter and Grover (2015)              |                      |                    |                     |                        |                       |
| Cheng and Grünh (2015)                |                      |                    |                     | X                      |                       |
| Hansen <i>et al.</i> (2015)           |                      |                    |                     |                        | X                     |
| Myers (2015)                          | X                    |                    | X                   |                        |                       |
| Palacios-Marqués <i>et al.</i> (2015) |                      |                    |                     |                        | X                     |
| Segev <i>et al.</i> (2015)            |                      |                    |                     |                        | X                     |

(continued)

Table AII.  
Concept matrix

Table AII.

| Authors (chronological order)    | Condition similarity | Context similarity | Catalyst similarity | Consequence similarity | Connection similarity |
|----------------------------------|----------------------|--------------------|---------------------|------------------------|-----------------------|
| Vătămănescu <i>et al.</i> (2015) |                      | X                  |                     |                        |                       |
| Bahns <i>et al.</i> (2016)       | X                    | X                  |                     | X                      | X                     |
| Gehlbach <i>et al.</i> (2016)    |                      |                    | X                   | X                      |                       |
| Panteli and Marder (2016)        |                      |                    |                     |                        | X                     |
| Popa <i>et al.</i> (2016)        |                      |                    |                     |                        | X                     |
| Rubinstein and Salant (2016)     |                      |                    | X                   | X                      |                       |
| Vătămănescu <i>et al.</i> (2016) |                      |                    | X                   |                        | X                     |
| Vătămănescu <i>et al.</i> (2017) |                      | X                  |                     |                        | X                     |

**Source:** Adapted from Webster and Watson (2002, p. xvii)

**Corresponding author**

Elena-Mădălina Vătămănescu can be contacted at: [madalina.vatamanescu@facultateademanagement.ro](mailto:madalina.vatamanescu@facultateademanagement.ro)

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