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Social connectedness: concept and measurement

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Abstract. Social connectedness, i.e. the experience of belonging and relatedness between people, is a central concept in understanding and evaluating communication media, in particular awareness systems. A generic measure based on this construct can support the design of such systems. The current paper describes the construction of two questionnaires for the measurement of this concept. These questionnaires were subsequently applied in survey studies in order to establish the structure of the concept and to identify the items that are suited for the measurement of its dimensions. One questionnaire was subjected to an initial validation. We conclude with some preliminary suggestions regarding (design) approaches to foster social connectedness.

Keywords. Awareness systems, social connectedness

1. Social connectedness

The ever-extending palette of communication tools, such as telephone, text messaging, email, instant messaging, online communities, and awareness systems has broadened our communication horizon significantly. An important outcome of the use of these communication technologies is the enhancement of a feeling of belonging and relatedness [1]. In light of this a theoretical construct is needed that is amenable to an operationalization that allows for sensitive and time discriminant measurement of subtle changes in the subjective experience of belonging and relatedness resulting from the use and introduction of different communication systems. To this end we reviewed relevant literature from social psychology and communication sciences pertaining to feelings of belonging and closeness, arriving at the concept of *Social connectedness*. We define social connectedness as a short-term experience of belonging and relatedness, based on quantitative and qualitative social appraisals, and relationship salience [2]. The subjective experience of belonging lies at the core of the construct of social connectedness, which has been designed to capture social experiences originating from recent interactions and provision of awareness information. Whereas the appraisals involve the satisfaction with one's social situation [3], relationship salience captures thinking of others and the feeling of being together outside of social contact [4]. Through emphasizing short-term social information, social connectedness

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intends to capture social experiences originating from recent interactions and provision of awareness information.

Thus, the concept addresses a broad scope of short-term transient social experiences originating from mediated and unmediated interactions and the mediated provision of awareness information (i.e. information about other people, including information about their whereabouts, mood, activities, and availability for contact) [4]. Two types of social connectedness have been identified. Social connectedness at the overall level pertains to one's whole social network, while social connectedness at the individual level is the feeling regarding a particular person. This differentiation is relevant, because some communication applications may focus on social experiences that are based on one-on-one communication (e.g. text messaging), while others affect the feeling of connectedness with one's larger social network (e.g. Facebook).

More and more advanced communication technologies, in particular awareness systems, are being developed that aim to foster a feeling of belonging and relatedness. However, up until now, the testing of such applications has mainly been restricted to acceptance and usability, while the social effects of such applications have only been tested in an ad hoc qualitative fashion. This stems from a lack of generic instruments to assess these social outcomes, which we believe hampers the development of these applications, as designer choices cannot be systematically compared and evaluated. A generic measure that addresses this can help to gain knowledge about the effectiveness of communication tools in serving the affective needs of communicating parties. This provides insight in how communications systems can be improved in this regard, thereby supporting the systematic and explicit design of such systems.

The current paper describes the construction of two questionnaires for the measurement of social connectedness (one at the individual and one at the overall level) based on its theoretical conceptualization. These questionnaires are applied separately in two survey studies, in order to determine the structure of the concept and to identify of the items that are suited for the measurement of its dimensions. The measure of social connectedness at the individual level is subjected to an initial validation.

2. Measurement of social connectedness

From the conceptualization of social connectedness flow a number of requirements for its measurement:
- Two measures of social connectedness are needed: one at the individual level and one at the overall level;
- All the relevant aspects of social connectedness should be captured, including qualitative and quantitative social appraisals, and relationship salience;
- A short-term time frame should be used.

We generated a pool of items reflecting all the different aspects of social connectedness we identified in our conceptualization. The *UCLA Loneliness Scale* [5], the *Wittenberg Loneliness Scale* [6], the *Affective Benefits and Costs of Communication Questionnaire* [4], the *Sternberg Intimacy Scale* [7], and the *Subjective Closenes Index* [8] served as sources of inspiration for the wordings of items. Relationship salience involves experiences such as the sense of being in touch, presence-in-absence [9], and

experiential outcomes of "social snacking" [10]. To capture such experiences we generated items that capture thinking of others and the feeling of being together outside of social contact.

The social appraisals are evaluations regarding one's social situation. Given the subjective nature of this experience, it involves the satisfaction with one's social situation and not objective information regarding one's social situation as such (e.g. the number of hours spent with others). In the measurement of the qualitative appraisals of social relationships we included feelings of closeness, feelings of involvement in each others' lives, knowledge of each other's thoughts and feelings, having the same world views, and sharing experiences. The quantitative aspects refer to the satisfaction with both the size of one's social network and with the amount of social interaction. A series of pretests resulted in a set of 29 items for the measurement of connectedness at the individual level and a set of 37 items for the measurement of connectedness at the overall level.

We developed a set of items that were used for the measurement of social connectedness both at the individual and the overall level. The items in the questionnaire at the individual level held the name of a specific person. The items in the overall level measure referred to "people in my social network". Only social connectedness at the overall level holds the quantitative dimensions, because it also pertains to one's whole social network, while social connectedness at the overall level does not. The response scales were as follows: (1) completely disagree, (2) disagree, (3) somewhat disagree, (4) neither agree nor disagree, (5) somewhat agree, (6) agree, and (7) completely agree[2]. Following [11] we instructed participants to hold in mind how they felt during the past two weeks to achieve a transient framing. Our participants received the following instruction: "This questionnaire is about how you experience your social relationship and social contacts with [name of a person/people in your social network] in the last two weeks. With contacts we mean conversations/communication in each others' company or through media (telephone, chat, email, text messaging, etc.)."

3. Survey studies

We administered each questionnaire to two separate samples through surveys. This resulted in two data sets on which we performed factor analyses to determine the dimensional structure of social connectedness. We first performed a primary factor analysis on all the items. The factors yielded by this we subjected to a secondary factor analysis (hierarchical factor analysis) to establish main dimensions that lie at an overarching level[3].

3.1 Social connectedness at the individual level

The questionnaire on social connectedness at the individual level was completed by 174 participants. Half of the participants rated their social connectedness toward a distant acquaintance, while the other half rated their social connectedness toward a friend. The purpose of this was to compare between these two conditions. Higher scores in the fiend condition would provide preliminary support for the validity of the

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[2] Some items had other response formats: see bottom of Table 1.
[3] See [12] for a complete description of the statistical procedure and detailed results of the factor analyses.

construct. Participants logged on to a server, on which they responded to the items. At the start participants were instructed to take either a close friend or a distant acquaintance in mind and input the name of this person. The software was thus programmed that this name appeared in the survey questions. On average, participants took about 5 minutes to complete the questionnaire. Movie ticket vouchers were raffled amongst the participants as a reward.

We found two main dimensions in the hierarchical factor analysis: the *Sense of sharing and involvement* and *Dissatisfaction with contact quality*. The results from the primary factor analysis are summarized in Table 2. The first main dimension contained four sub-dimensions: *Relationship salience, Shared understandings, Knowing each others' experiences* and *Feelings of closeness*. The second main dimension only consisted of *Dissatisfaction with contact quality*. As can be seen in Table 1, T-tests show that all dimensions in the friend condition were significantly higher than in the distant acquaintance condition.

3.2 Social connectedness at the overall level
Using a paper and pencil format, the questionnaire on social connectedness at the overall level was completed by 215 participants. On average, participants took about 5 minutes to complete the questionnaire. They received a candy bar as a reward. We found two main dimensions in the hierarchical factor analysis: the *Sense of sharing and involvement* and *Social appraisals*. The findings of the primary factor analysis are outlined in Table 3. The first main dimension consisted of three sub-dimensions: *Relationship salience, Shared understandings*, and *Knowing each others' experiences*. The second dimension also consisted of three sub-dimensions: *Satisfaction with contact quantity, Dissatisfaction with contact quantity*, and *Dissatisfaction with contact quality*.

Table 1: Results T-tests on the dimensions[a]

	Acquaintance		Friend		T-value[b]
	M	*SD*	*M*	*SD*	
1. Relationship salience	-.32	1.15	.28	.96	3.64*
2. Dissatisfaction with contact quality	-.35	1.22	.30	.91	3.93*
3. Shared understandings	-.37	1.13	.32	.97	4.27*
4. Knowing each others' experiences	-.59	1.06	.52	.73	7.95*
5. Feelings of closeness	-.59	1.00	.51	.80	7.88*
I. Sense of sharing and involvement	-.67	1.07	.59	.83	8.58*
II. Dissatisfaction with contact quality	-.22	1.13	.19	.85	2.68*

[a] All variables are standardized
[b] Equal variances not assumed
*p-value < .05

Table 2: Specific Connectedness Dimensions: Factor Loadings

1. *Relationship salience*				
Aside from our contact, I often feel "together" with X[a] somehow.	..73			
I often think of X.	..69			
Even when we are not in each others' company, I often feel "together" with X somehow.	..63			
I am often aware of my relationship with X.	..44			
2. *Dissatisfaction with contact quality*				
I derive little satisfaction from my contact with X (R).		.80		
I feel that X does not understand me well (R).		.70		
My contact with X feels superficial (R).		.61		
3. *Shared understandings*				
I feel that X shares my interests and ideas.			.84	
I feel I have a lot in common with X.			.58	
I feel on the same wavelength with X.			.52	
4. *Knowing each others' experiences*				
I often know what X feels.				.83
I often know what X thinks.				.77
I feel that X often knows what I think.				.68
I sense that X often knows what I feel.				.60
5. *Feelings of closeness*				
In comparison with all your other relationships (with both men and women), how close is your relationship with X?				..82
In comparison with what you know of the relationships of other people (with both men and women), how close is your relationship with X?				..78
I feel I can talk about anything with X.				..74
I feel that X and I can communicate well with each other.				..67

(R) The items in the second and fourth factor are reverse coded

[a] X stands for the name of the person the participant put in

Table 3: Overall Connectedness Dimensions: Factor Loadings

1. Knowing the others' experiences					
I often know what people in my social network think.	.81				
I often know what people in my social network feel.	.50				
I am often aware of my relationships with people in my social network.	.47				
2. Dissatisfaction with contact quantity					
I would like to have a larger circle of friends(R).		.67			
I feel a lack of company (R).		.67			
I would like to have a close relationship with more people (R).		.66			
I feel a lack of contact with people in my social network (R).		.60			
I feel a lack of social relationships (R).		.51			
3. Satisfaction with contact quantity					
How satisfied are you with the number of people with whom you have social contact?			.81		
How satisfied are you with the number of contacts with the people in your social network?			.80		
How satisfied are you with the number of people in your social network?			.71		
How satisfied are you with the total amount of time that you have contact with people in your social network?			.54		
4. Dissatisfaction with contact quality					
The social contacts with people in my social network feel superficial (R).				.71	
My relationships with people in my social network feel superficial (R).				.51	
I derive little satisfaction from my social contacts (R).				.48	
5. Relationship salience					
Even when we are not in each others' company, I often feel "together" with people in my social network somehow.					.84
Aside from our contact, I often feel "together" with people in my social network somehow.					.72
I feel that people in my social network often think of me.					.56
I often think of people in my social network.					.46
6. Shared understandings					
I feel I have a lot in common with people in my social network.					.76
I feel on the same wavelength with people in my social network.					.61
I feel that people in my social network share my interests and ideas.					.59

(R) The items in the second and fourth factor are reverse coded

4. Discussion

The current paper describes the construction of two questionnaires for the measurement of social connectedness (one at the individual and one at the overall level) based on a theoretical conceptualization. These questionnaires were subsequently applied in two survey studies, in order to establish the structure of the concept and to identify the items that are suited for the measurement of its dimensions. The studies show a large overlap between the dimensional structures of the two constructs. The measure of social connectedness at the individual level was subjected to an initial validation. The data from our specific connectedness measure and its subscales showed that the scores in the friend condition were significantly higher. This provides preliminary support for the validity of the scale and its dimensions. We are currently validating the measure in experiments. Findings from a first experiment [13] add to the validity of our specific connectedness construct. More experimental and field research is needed to further establish the validity of both measures. In the current study a time frame of two weeks was used. However, depending on the goals of a particular study, different phrasings can be used, such as "at this moment", "today", or "this week".

Field studies using real applications in natural settings should provide feedback on concrete (prototype) design. At this point however, we would like to offer some preliminary suggestions regarding (design) approaches to foster social connectedness. Our concept and some preliminary findings seem to suggest that there are several ways to foster social connectedness. One inroad is the salience of social relationships by representing or reminding people of their social connection to one or more close others. By doing so people may feel connected to close others by thinking of them or through feelings of togetherness outside of actual contact. Another way is to heighten the satisfaction with one's social situation. This can be approached qualitatively by increasing feelings of closeness, shared understandings and the provision of information about each others' feelings and thoughts. A quantitative approach would require the enhancement of actual or perceived amount of social relationships and interactions one has. An application may for example nudge the user to communicate when he/she is alone and it may show how many contacts people actually have available.

The comprehensive dimensional approach of social connectedness allows for a differentiation of the social outcomes that various communication systems may have. These outcomes depend on the type of information that is relayed between people [14]. Pervasive awareness systems that use sensor data from intelligent environments may have specific effects depending on the information involved. Non-intentionally relayed information that is very basic (e.g. being at home or not versus one's feelings) probably has specific effects. The low intentionality involved with and the often limited nature of the information that can be relayed may restrict the feelings of connectedness it can evoke. Systems that focus on activity and availability may for example have a specific impact on the dimensions *Relationship salience* and *Sharing experiences*. If information regarding availability leads to more social contact, it may influence quantitative appraisals as well. To conclude, we believe that the social connectedness construct provides a uniquely theory-based, comprehensive and sensitive tool to advance the development of communication technology, and awareness systems in particular.

Acknowledgements

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