

Perceiving Built Spaces and Structures: A Study of Affective and Emotional Responses

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Abstract

Individuals exhibit varied emotional responses when facing a built structure, or when being introduced into a planned, designed space. Yet, a reasonably *detailed* and *complete* taxonomy or list of such emotional responses is currently unknown. To address this problem, we first analyzed a couple of authoritative secondary sources concerned with man-built spaces and produced a large set of adjectives describing such emotional responses. We then experimentally evaluated this set of adjectives for internal consistency and for possible underlying factors, by obtaining responses from $N = 40$ participants. Subsequent analysis detected a total of eight factors¹ underlying the set of adjectives used to describe one's experience when facing and entering said structures and spaces.

Keywords: affect, emotions, aesthetics, architecture, built environments, factor analysis.

1 Introduction

All people, professionals and amateurs alike, use various qualifying words to describe their *emotional response* when faced with a man-built *structure*, or when introduced into a man-built *space*. Examples

¹Simulated data.



Figure 1: Taj Mahal, Agra, India.

of such responses include: a *nice* house; a *beautiful* house; an *ugly* house; a *lively* street; an *impressive* skyscraper; a *cozy* kitchen; an *elegant* bridge; or an *upscale* neighborhood. For most people, the Taj Mahal mausoleum (Fig. 1) and the Piazza del Campo public space (Fig. 2) usually elicit rather positive affective responses; and indeed, both are usually agreed upon to be one of the most “*beautiful*” buildings (and public spaces, respectively) in the world.

Yet, in spite of a substantial body of prior work in related research areas (see e.g. Mehrabian and Russell (1974) as applied to general environments), little research on the formal properties of this set of adjectives (*nice*, *beautiful*, *ugly*, *lively*, *impressive*, *cozy*, *elegant*, *upscale*, ...) describing our emo-



Figure 2: (b) Piazza del Campo, Siena, Tuscany, Italy.

tional responses in the presence of man-built structures and spaces, exists. This leaves unanswered a number of questions: can we detect any underlying structure in the resultant space of emotional responses? Can we somehow reduce the large set of adjectives (denoting emotional responses) to a relatively small number of constructs that account for most of the variance? Better yet, can we perhaps come up with a set of orthogonal dimensions, fully describing the space of affective responses?

Arguably one of the most undesirable consequences of not knowing the answers to the aforementioned questions is the resultant inability to formally² correlate (or *to map*, see Fig. 3) properties of final (physical) environmental designs with induced affect/emotions. This in turn prevents us to discover which design properties induce “good” (*beautiful, elegant, . . .*) or “bad” (*ugly, intimidating, . . .*) affect or emotions; which will ultimately prevent us to build “better” architectural spaces and structures, due to not being able to distinguish which design properties map onto the class of “good” affects or emotions.

As a potential benefit of finding out more about the nature of said emotional responses, we should also note that the existing literature on what con-

²By “formally” we mean conforming with the principles (or methods) used in science, as distinguished with the methods originating in design practice.

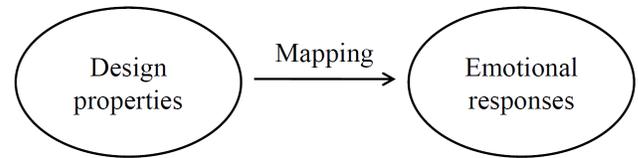


Figure 3: By knowing the nature of Emotional responses (which in this diagram is depicted as the range [or co-domain] of the mapping), we can study the mapping(s) from the set of Design properties to the set of Emotional responses, thus helping us to distinguish between “good” and “bad” design properties, thus helping us to build “better” spaces and structures, therefore advancing the state-of-art of AEC and related disciplines.

stitutes “good” design (as a representative example see for example (Alexander et al., 1977) and (Alexander, 1979)) are based on practical considerations, not on science, and researching emotional responses would represent the first step towards formally corroborating (or refuting) such claims on what constitutes “good design” or “sensible design”, this time of course based on sound scientific principles.

To try to fill this gap, that is, to learn more about the said emotional responses, in this work we conduct a study of emotional (or *affective*) states related to experiencing various built spaces and structures, by first extracting a number of adjectives denoting certain emotional responses, and then carrying out an experimental evaluation based on responses of a number of participants.

2 Background

2.1 Definitions of Relevant Terms

In this work, by *affect* we presuppose a technical term as used in psychology and psychiatry. A number of definitions of affect exist in the literature, however we shall adopt the following definitions:

- Affect is the very first (non-thinking) *reaction* that we experience when faced with an object or phenomenon (Zajonc, 1980).
- Affect is the “biological portion of emotion”, a “hard-wired, preprogrammed, genetically transmitted mechanisms that exist in each of us” and which triggers a “known pattern of biological events” (Nathanson, 1992).

Thus one can say that affect is a primordial reaction which then later gets worked out into concrete emotions³. An *emotion* is simply any strong agitation of the feelings actuated by experiencing love, hate, fear, etc., and usually accompanied by certain physiological changes, as increased heartbeat or respiration, and often overt manifestation, as crying or shaking.

Finally, for the sake of clarification, *moods* differ from emotions in that they are “softer”, more unfocused and typically of longer duration, when compared to emotions which tend to be sharply defined and for which we always know the cause. According to (Thayer, 1997), there are two dimensions (energy and tension) to moods:

- Energy: ENERGETIC ↔ TIRED, and
- Tension: CALM ↔ TENSE.

In this schema, according to the author, the best mood combination is ENERGETIC+CALM, while the worst is TIRED+TENSE.

In this work, we focus solely on affect and emotions.

2.2 Related Work

In this section we give a chronologically ordered list of pertinent prior work.

³Note that some authors use these two terms (affect and emotion) interchangeably, however in this work we clearly differentiate between the two.

Vitruvius (b. around 70 BC), a Roman master builder, famously stated in his treatise *De architectura* (The Ten Books of Architecture) that any architectural structure should possess the qualities of *firmitas*, *utilitas*, *venustas*, that is, it should possess the properties of being *solid* (i.e. “good” in the sense of being characterized by a substantial quality), *useful*, and *beautiful* (Morgan, 2005). This concept of “beauty”(or “delight”) is one of the defining features of architecture and it “implies a strong interest/arousal component rather than a simple evaluative component” (Purcell, 1986).

During the Baroque era (cca. 1580–1750), the rather popular theory of *Affektenlehre* tried to associate the musical content of a work with the emotional response of a listener and prescribed that there are three scales of emotions (with a total of six opposite poles): LOVE ↔ HATE, JOY ↔ SORROW, and WONDER ↔ DESIRE.

In (Russell & Mehrabian, 1977) it is claimed that the three independent and bipolar dimensions: 1) pleasure-displeasure, 2) degree of arousal, and 3) dominance-submissiveness, are both necessary and sufficient to define individuals’ emotional responses to an environment. Furthermore, these three constructs are further decomposed into the following continua (sub-scales):

- Pleasure (a feeling state that is similar to liking, but is also correlated with arousal):
 1. HAPPY ↔ UNHAPPY
 2. PLEASED ↔ ANNOYED
 3. SATISFIED ↔ UNSATISFIED
 4. CONTENTED ↔ MELANCHOLIC
 5. HOPEFUL ↔ DESPAIRING
 6. RELAXED ↔ BORED
- Arousal (a feeling state varying along a single dimension ranging from sleep to frantic excitement):
 1. STIMULATED ↔ RELAXED
 2. EXCITED ↔ CALM
 3. FRENZIED ↔ SLUGGISH
 4. JITTERY ↔ DULL

- 5. WIDE-AWAKE ↔ SLEEPY
- 6. AROUSED ↔ UNAROUSSED

- Dominance (a feeling state that is based on the extent to which an individual has control over his/her act [or not] in variety of ways):

- 1. CONTROLLING ↔ CONTROLLED
- 2. INFLUENTIAL ↔ INFLUENCED
- 3. IN CONTROL ↔ CARED-FOR
- 4. IMPORTANT ↔ AWED
- 5. DOMINANT ↔ SUBMISSIVE
- 6. AUTONOMOUS ↔ GUIDED.

Zajonc (1980) claims that *affect* is the first reaction that we experience when faced with an object or phenomenon, and that affect thus comes before any cognition related to the experience. Furthermore, any human perception is interlaced with affect and goes on to give an example that “we do not just see a house: we see a *handsome* house, an *ugly* house, or a *pretentious* house”.

According to (Purcell, 1986) affective response occurs when there is a mismatch or discrepancy between the attributes of the current instance and the attributes of the prototype. The two expressions “current instance” and the “prototype” refer to a particular environment.

According to (Nathanson, 1992), there is a total of nine affects:

- Positive:
 - Enjoyment/Joy: smiling, lips wide and out
 - Interest/Excitement: eyebrows down, eyes tracking, eyes looking, closer listening
- Neutral:
 - Surprise/Startle: eyebrows up, eyes blinking
- Negative:
 - Anger/Rage: frowning, a clenched jaw, a red face
 - Disgust: the lower lip raised and protruded, head forward and down

- Dismissal (reaction to bad smell): upper lip raised, head pulled back
- Distress/Anguish: crying, rhythmic sobbing, arched eyebrows, mouth lowered
- Fear/Terror: a frozen stare, a pale face, coldness, sweat, erect hair
- Shame/Humiliation: eyes lowered, the head down and averted, blushing

In (Forgas, 2001) p.31, Zajonc argues that affect and cognition are indeed two separate mental processes. In other words, affect is inaccessible to a person’s awareness:

The conclusions (...) derive from a series of experimental findings in which specific affective experiences are induced at such low levels of energy that person is not aware of them. Since there is no recognition or recognition memory of the sources of these experiences, we might say that there is no corresponding cognition to which the person has any access.

In the same work, affect and cognition are contrasted in terms of prototypical statements: “I like A better than B” (affect) and “I have seen A previously, but I have never seen B” (cognition).

According to Bradley (2003), there are two fundamental affective states: positive and negative. Both of these two affective states may be later elaborated into unanalyzable emotional feelings such as happiness, anger, fear, sadness, joy and disgust. Affect, emotions and arousal are dictated by neural circuitry (especially by amygdala).

In (Cochrane, 2009) the author proposes eight dimensions of emotions:

1. *Valence* (ATTRACTED ↔ REPULSED),
2. *Personal strength* (POWERFUL ↔ WEAK),
3. *Freedom* (FREE ↔ CONSTRAINED),
4. *Probability* (CERTAIN ↔ UNCERTAIN),

5. *Intentional focus* (GENERALIZED ↔ FOCUSED),
6. *Temporal flow* (FUTURE DIRECTED ↔ PAST DIRECTED),
7. *Temporal duration* (ENDURING ↔ SUDDEN), and
8. *Social connection* (SOCIALLY CONNECTED ↔ DISCONNECTED).

PANAS-X is a tool (60-item questionnaire) for measuring both positive and negative affect (Watson & Clark, 1994). It's simple to administer and it takes only around 10 minutes for the participants to complete. The 60 items are:

- General Dimension Scales:
 - Negative Affect (10): afraid, scared, nervous, jittery, irritable, hostile, guilty, ashamed, upset, distressed
 - Positive Affect (10): active, alert, attentive, determined, enthusiastic, excited, inspired, interested, proud, strong
- Basic Negative Emotion Scales:
 - Fear (6): afraid, scared, frightened, nervous, jittery, shaky
 - Hostility (6): angry, hostile, irritable, scornful, disgusted, loathing
 - Guilt (6): guilty, ashamed, blameworthy, angry at self, disgusted with self, dissatisfied with self
 - Sadness (5): sad, blue, downhearted, alone, lonely
- Basic Positive Emotion Scales:
 - Joviality (8): happy, joyful, delighted, cheerful, excited, enthusiastic, lively, energetic
 - Self-Assurance (6): proud, strong, confident, bold, daring, fearless
 - Attentiveness (4): alert, attentive, concentrating, determined
- Other Affective States:
 - Shyness (4): shy, bashful, sheepish, timid
 - Fatigue (4): sleepy, tired, sluggish, drowsy
 - Serenity (3): calm, relaxed, at ease
 - Surprise (3): amazed, surprised, astonished

As stated in (Watson & Clark, 1994), “trait scores on the PANAS-X scales (a) are stable over time, (b) show significant convergent and discriminant validity when correlated with peer-judgments, (c) are highly correlated with corresponding measures of aggregated state affect, and (d) are strongly and systematically related to measures of personality and emotionality.”

Another, newer scale that measures both positive and negative affect is called STEM (Levine & Xu, 2005); the affects measured are:

- Positive affects (5): attentiveness/energy, love, pride, contentment, and joy.
- Negative affects (5): anger, envy, guilt/shame, sadness and anxiety.

The Emotion Annotation and Representation Language (EARL) proposed by the HUMAINE network consists of 48 items (Schröder, Pirker, & Lamolle, 2006):

- Negative and forceful: Anger, Annoyance, Contempt, Disgust, Irritation.
- Negative and not in control: Anxiety, Embarrassment, Fear, Helplessness, Powerlessness, Worry.
- Negative thoughts: Doubt, Envy, Frustration, Guilt, Shame.
- Negative and passive: Boredom, Despair, Disappointment, Hurt, Sadness.
- Agitation: Stress, Shock, Tension.
- Positive and lively: Amusement, Delight, Elation, Excitement, Happiness, Joy, Pleasure.
- Caring: Affection, Empathy, Friendliness, Love.
- Positive thoughts: Courage, Hope, Pride, Satisfaction, Trust.
- Quiet positive: Calm, Content, Relaxed, Relieved, Serene.
- Reactive: Interest, Politeness, Surprised.

According to (Parrott, 2001), emotions can be organized into an hierarchy as follows (the first level represents primary emotions, second level secondary emotions, and the third level tertiary emotions):

- Love:
 - Affection: Adoration, fondness, liking, attraction, caring, tenderness, compassion, sentimentality.
 - Lust/Sexual desire: Arousal, desire, lust, passion, infatuation.
 - Longing: Longing.
 - Joy:
 - Cheerfulness: Amusement, bliss, cheerfulness, gaiety, glee, jolliness, joviality, joy, delight, enjoyment, gladness, happiness, jubilation, elation, satisfaction, ecstasy, euphoria.
 - Zest: Enthusiasm, zeal, zest, excitement, thrill, exhilaration.
 - Contentment: Contentment, pleasure.
 - Pride: Pride, triumph.
 - Optimism: Eagerness, hope, optimism.
 - Enthrallment: Enthrallment, rapture.
 - Relief: Relief.
 - Surprise:
 - Surprise: Amazement, surprise, astonishment.
 - Anger:
 - Irritation: Aggravation, irritation, agitation, annoyance, grouchiness, grumpiness, crosspatch.
 - Exasperation: Exasperation, frustration.
 - Rage: Anger, rage, outrage, fury, wrath, hostility, ferocity, bitterness, hate, scorn, spite, vengeance, dislike, resentment.
 - Disgust: Disgust, revulsion, contempt, loathing.
 - Envy: Envy, jealousy.
 - Torment: Torment.
 - Sadness:
 - Suffering: Agony, suffering, hurt, anguish.
 - Sadness: Depression, despair, hopelessness, gloom, glumness, sadness, unhappiness, grief, sorrow, woe, misery, melancholy.
 - Disappointment: Dismay, disappointment, displeasure.
 - Shame: Guilt, shame, regret, remorse.
 - Neglect: Alienation, isolation, neglect, loneliness, rejection, homesickness, defeat, dejection, insecurity, embarrassment, humiliation, insult.
 - Sympathy: Pity, sympathy.
 - Fear:
 - Horror: Alarm, shock, fear, fright, horror, terror, panic, hysteria, mortification.
 - Nervousness: Anxiety, nervousness, tenseness, uneasiness, apprehension, worry, distress, dread.
- Plutchik (2001) states that around one hundred definitions of the concept of “emotion” have been offered over the past century, and approximately the same number of theories on emotion, and based on this proposes a 3D circumplex model of emotions (see Fig. 4).
- Ekman (1999) proposes seven basic emotions:
1. Fear: Danger lurks
 2. Sadness: Impending loss
 3. Anger: Conspecific threat, trespass, thwarted goals, plea for justice
 4. Joy: Impending gain
 5. Surprise: Unexpected event
 6. Disgust: Contamination, toxic contact
 7. Contempt: Substandard behavior or being

3 Methodology

3.1 Participants

Our participant pool consisted of 40 participants, of which 22 were male. All were recruited from various undergraduate programs at Simon Fraser University, Surrey, Canada. Participants’ age ranged from 21 to 29, and all had normal or corrected-to-normal vision.

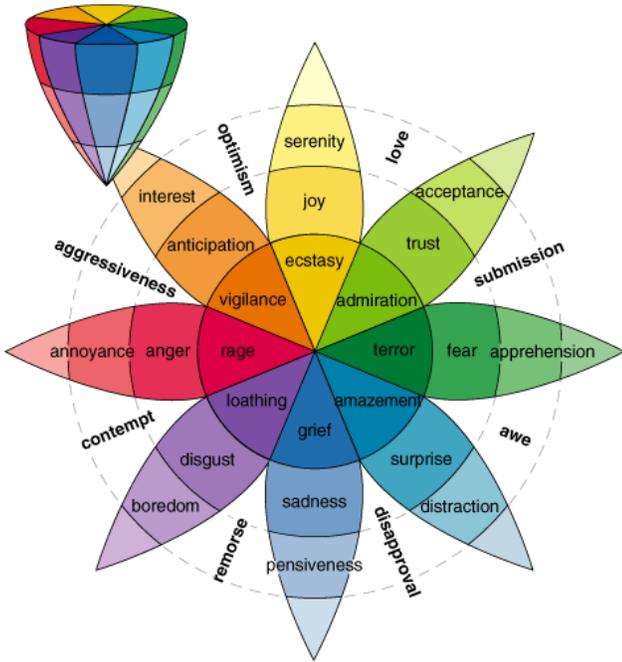


Figure 4: Plutchik's 3D circumplex model describes the relations among emotion concepts, which are analogous to the colors on a color wheel. The cones vertical dimension represents intensity, and the circle represents degrees of similarity among the emotions. The eight sectors are designed to indicate that there are eight primary emotion dimensions defined by the theory arranged as four pairs of opposites. In the exploded model the emotions in the blank spaces are the primary dyads – emotions that are mixtures of two of the primary emotions. (Plutchik 2001; picture adapted from www.fractal.org)

3.2 Questionnaire

To develop the questionnaire for our experiment, we first performed OCR (Optical character recognition) on the scanned images of selected representative printed texts (Alexander, 1979; Alexander et al., 1977) into machine encoded text. In this pilot study, we limited ourselves to just these two authoritative sources, however an extended, full-scale study should consult a larger number of secondary sources.

From the obtained text corpora we then automat-

ically extracted 50 most frequent adjectives related to experiencing man-built structures and spaces, and used those as 50 items on our questionnaire. Each adjective was then attributed a 11-point Likert scale, indicating the intensity of “feeling” experienced by participants when exposed to visual stimuli.

The extracted 50 adjectives were⁴: *alive, timeless, dead, loose, free, locked, living, new, unique, awe-inspiring, rich, complex, large, whole, unpredictable, without control, ageless, sharp, precise, great, beautiful, vivid, natural, powerful, vibrant, peaceful, relaxed, . . .*

Since almost all secondary sources deal with positive design properties (generating positive affects and emotions listed above), we understood those initially extracted “positive” adjectives to be indicators of scales, to be supplemented by associated *negative* adjectives denoting negative design properties (we list full scales below):

- *alive* ↔ *dead*,
- *timeless* ↔ *ephemeral*,
- *loose* ↔ *tight*,
- *free* ↔ *unfree*,
- *locked* ↔ *unlocked*,
- *new* ↔ *old*,
- *unique* ↔ *common*,
- *awe-inspiring* ↔ *ordinary*,
- *rich* ↔ *poor*,
- *complex* ↔ *simple*,
- *large* ↔ *small*,
- *whole* ↔ *broken*,
- *unpredictable* ↔ *predictable*,
- *without control* ↔ *with control*,

⁴Note: preliminary data (manually extracted adjectives).

- *sharp*↔*dull*,
- *precise*↔*imprecise*,
- *great*↔*awful*,
- *beautiful*↔*ugly*,
- *vivid*↔*muted*,
- *natural*↔*artificial*,
- *powerful*↔*weak*,
- *vibrant*↔*listless*,
- *peaceful*↔*stormy*,
- *relaxed*↔*tense*, ...

Still, please note that the initial extraction process also came up with some negative adjectives (e.g. *dead*, *locked*) and those were coalesced into their corresponding continua. Also, some adjectives were coalesced into the same synset (for example, *alive* + *living*, and *timess* + *ageless*).

3.3 Visual Stimuli

The participants were shown a number of color images depicting various man-built spaces and structures.

The spaces included: parks, landscapes, streets, public squares, shopping mall plazas, and various standard rooms (living rooms, great rooms, kitchens, bathrooms, bedrooms).

The structures included: skyscrapers, residential buildings (detached, semi-detached, apartment buildings), commercial buildings (hotels, banks, convention centers, shopping malls), educational buildings (schools, museums, theaters, universities), government buildings (city halls, fire stations, parliaments), industrial buildings (factories, power plants), religious buildings (churches, mosques, monasteries, shrines, synagogues, temples and pagodas) and some other objects (bridges, hospitals, stadiums, marinas).

3.4 Experimental Procedure

Each participant was first familiarized with the content of the standard Simon Fraser University “Informed Consent” form, explaining that all the information obtained will be kept confidential, asking whether the participant was at least 19 years old, explaining that the participant may have withdrawn participation at any time, and other items associated with the participant’s permission to conduct the study. After the Consent Form has been signed by the participant, a unique numeric ID was generated for the participant. All subsequent data collection were made using this ID only, to ensure confidentiality of data. Each participant then filled out a pre-test questionnaire for basic demographic data. The test administrator then gave an introductory note about the purpose of this experiment, and the main parts of the experiment.

All participants were then presented with 10 randomly selected images of spaces and structures. For each of these, a participant had to complete a questionnaire containing 50 items, therefore there were (10 × 50) items to be answered total, for each participant. As the participants answered the items, the test administrator was prohibited from offering any assistance. The completion of this procedure took on the average about one hour.

3.5 Analysis Techniques

To assess scale reliability (i.e. the internal consistency of responses to the scale) related to the questionnaire we used, we used Cronbach’s alpha (α). Our goal was to assess how the observed variables (i.e. participants’ responses) are influenced by true scores (i.e. indications of where the participants actually stand on the variable of interest). In other words, we were interested in determining the percent of variance in an observed variable that is accounted for by true scores on the underlying construct.

Finally, we then performed *exploratory factor*

analysis to try to reduce the initial set of 50 variables to a significantly smaller set of factors underlying those variables.

4 Results

4.1 Internal Consistency of Scales

Estimates of internal consistency as measured by Cronbach's alpha all exceeded 0.70⁵ and are reported on the diagonals of Tables 1, 2 and 3 (see page 11). According to (Nunnally, 1978) 0.70 is an acceptable reliability coefficient. Since scales are reliable, we proceeded to perform additional analyses (exploratory factor analysis).

4.2 Exploratory Factor Analysis

We performed an exploratory factor analysis to try to uncover the latent structure (dimensions) of our set of variables. In other words, we tried to reduce attribute space from a larger number of variables (50) to a smaller number of *factors*. Our a priori assumption was that any variable may be associated with any factor; therefore, we had no prior theory and we used factor loadings to intuit the factor structure of the data.

We came up with a total of 8 factors⁶:

1. Factor:
2. Factor:
3. Factor:
4. Factor:
5. Factor:
6. Factor:
7. Factor:

8. Factor:

5 Discussion

(discussion to be added after the experimental data will have been obtained)

6 Conclusion

(conclusion to be added after the experimental data will have been obtained)

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⁵Simulated results.

⁶Simulated results.

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A Appendix

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10
1	13.56	2.54	(0.90)									
2	15.60	3.22	0.37	(0.78)								
3	12.55	1.32	0.25	0.53	(0.72)							
4	22.35	3.31	0.55	0.23	0.66	(0.71)						
5	14.53	2.24	0.23	0.66	0.45	0.55	(0.65)					
6	12.55	1.21	0.73	0.12	0.34	0.45	0.12	(0.22)				
7	13.75	1.56	0.22	0.53	0.12	0.63	0.43	0.34	(0.57)			
8	17.22	2.11	0.42	0.63	0.66	0.34	0.33	0.33	0.45	(0.46)		
9	14.53	2.05	0.77	0.23	0.34	0.22	0.45	0.18	0.34	0.55	(0.23)	
10	11.12	1.82	0.24	0.77	0.66	0.67	0.23	0.77	0.33	0.45	0.44	(0.34)

Table 1: (SK: simulated data!) Means, std. dev., correlations, and coefficient alpha reliability estimates for the study's variables 1–10.

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10
1	13.56	2.54	(0.90)									
2	15.60	3.22	0.37	(0.78)								
3	12.55	1.32	0.25	0.53	(0.72)							
4	22.35	3.31	0.55	0.23	0.66	(0.71)						
5	14.53	2.24	0.23	0.66	0.45	0.55	(0.65)					
6	12.55	1.21	0.73	0.12	0.34	0.45	0.12	(0.22)				
7	13.75	1.56	0.22	0.53	0.12	0.63	0.43	0.34	(0.57)			
8	17.22	2.11	0.42	0.63	0.66	0.34	0.33	0.33	0.45	(0.46)		
9	14.53	2.05	0.77	0.23	0.34	0.22	0.45	0.18	0.34	0.55	(0.23)	
10	11.12	1.82	0.24	0.77	0.66	0.67	0.23	0.77	0.33	0.45	0.44	(0.34)

Table 2: (SK: simulated data!) Means, std. dev., correlations, and coefficient alpha reliability estimates for the study's variables 11–20.

Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10
1	13.56	2.54	(0.90)									
2	15.60	3.22	0.37	(0.78)								
3	12.55	1.32	0.25	0.53	(0.72)							
4	22.35	3.31	0.55	0.23	0.66	(0.71)						
5	14.53	2.24	0.23	0.66	0.45	0.55	(0.65)					
6	12.55	1.21	0.73	0.12	0.34	0.45	0.12	(0.22)				
7	13.75	1.56	0.22	0.53	0.12	0.63	0.43	0.34	(0.57)			
8	17.22	2.11	0.42	0.63	0.66	0.34	0.33	0.33	0.45	(0.46)		
9	14.53	2.05	0.77	0.23	0.34	0.22	0.45	0.18	0.34	0.55	(0.23)	
10	11.12	1.82	0.24	0.77	0.66	0.67	0.23	0.77	0.33	0.45	0.44	(0.34)

Table 3: (SK: simulated data!) Means, std. dev., correlations, and coefficient alpha reliability estimates for the study's variables 21–30.