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Associative processing and paranormal belief

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Abstract In the present study we introduce a novel task for the quantitative assessment of both originality and speed of individual associations. This 'BAG' (Bridge-the-Associative-Gap) task was used to investigate the relationships between creativity and paranormal belief. Twelve strong 'believers' and 12 strong 'skeptics' in paranormal phenomena were selected from a large student population ($n > 350$). Subjects were asked to produce single-word associations to word pairs. In 40 trials the two stimulus words were semantically indirectly related and in 40 other trials the words were semantically unrelated. Separately for these two stimulus types, response commonalities and association latencies were calculated. The main finding was that for unrelated stimuli, believers produced associations that were more original (had a lower frequency of occurrence in the group as a whole) than those of the skeptics. For the interpretation of the result we propose a model of association behavior that captures both 'positive' psychological aspects (i.e., verbal creativity) and 'negative' aspects (susceptibility to unfounded inferences), and outline its relevance for psychiatry. This model suggests that believers adopt a looser response criterion than skeptics when confronted with 'semantic noise'. Such a signal detection view of the presence/absence of judgments for loose semantic relations may help to elucidate the commonalities between creative thinking, paranormal belief and delusional ideation.

Key words creativity, delusion formation, paranormal belief, semantic processing, signal detection theory, word association.

INTRODUCTION

Creative thinking is commonly regarded as one of the highest cognitive functions, both from the point of view of individual psychology as well as from an evolutionary biological perspective. One crucial component of the creative process is the ability to establish new associations, a fact evidenced by the many creativity tests that, as different as they might seem at the surface level, ultimately all require the tested persons to browse associative-semantic information in an effective and flexible way. Among these tests are those that assess subjects' ability to find items of a specified category,[1,2] to provide interpretations of ambiguous stimuli,[3–5] to generate novel ideas or unique combinations,[6,7] to produce alternatives to overlearned schemata,[8] or to view ordinary things from an extraordinary perspective.[9]

Mednick has initiated a particularly fruitful approach to the study of creative thinking.[10] This author explicitly proposed an associative theory of the creative process which he thought was not limited to one particular field of endeavor but was equally valid for artistic, verbal and scientific creativity. Mednick introduced the Remote Associates Test (RAT) which requires subjects to find, for each of the 30 3-word items, a word that constitutes the missing associative link between the three stimulus words.[10] For instance, the words 'dog', 'tower', and 'wrist', although not directly related to one another, are all similar in that they are related to the target word 'watch'. Mednick presented evidence that those students who found more target words within a given time were also those who were rated by their teachers as being more

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creative.[10] He reported comparable correlation between RAT scores and rated creativity, despite the fields of creative achievement belonging to visual arts, architecture or psychological research.

The goal of the present study is to point to some neglected aspects of creativity research that are particularly relevant to psychiatry. Consideration of these aspects will not question the traditional view of creativity as a highly developed mode of thinking. Rather, it may help to broaden current concepts of creativity by putting emphasis on the Janusian face of the neuropsychological mechanisms underlying creative thought. We first consider a relationship, which may best be introduced by the RAT-like question as to the common denominator of 'creative thinking', 'paranormal belief', and 'thought disorder'. One concept linking all three cognitive phenomena is 'associative processing'.

Belief in the paranormal reportedly arises from the inclination (and ability) of some individuals to bridge an associative gap between two temporally coinciding events.[11–13] Once this gap is meaningfully bridged, inferences about a 'paranormal' causation seem necessary because meaningfulness is intuitively not readily compatible with the notion of a random origin. To give an example: a dream about Sigmund Freud's death the night before Alfred Adler died can be a powerful trigger for the cognitive illusion of a paranormal connection. This experience happened to a professional psychoanalyst and turned him, overnight, from a skeptic into a firm believer in extrasensory forms of information transfer.[14] Although it may not be exceedingly creative to link Freud to Adler for somebody familiar with psychoanalysis, we should hesitate to designate the inference about the existence of extrasensory perception from this dream as a proper 'delusional idea of reference'. Rather, paranormal ideation seems best to be placed on a continuum between a creative and a delusional elaboration of spontaneous associations. Turning now to the delusional end of this continuum, we note that associations between objectively unrelated events are a frequent trigger of 'apophenia' (i.e., the 'specific experience of an abnormal meaningfulness [of coincidental phenomena]'[15]). Apophenia is considered a key symptom of the early schizophrenic illness,[15] and its experienced closeness to the creative thought process is best expressed in the words of a schizophrenic nurse who, in retrospect, described the essence of her first psychotic episode (p. 584):

'Every single thing 'means' something. This kind of symbolic thinking is exhaustive . . . I have a sense that everything is more vivid and important; the incoming stimuli are almost more than I can bear. There is a connection to everything that happens—no coincidences. I feel tremendously creative.'[16]

Associative processing, in particular the aspect of individual differences in the ability to bridge associative gaps, may thus be central for the understanding not only of the creative but also of the paranormal, and finally disordered thought process. While on the one hand, there is quite some work on association behavior in relation to creativity[17–19] and on the other hand, to schizophrenic thinking,[20,21] few studies have systematically investigated associative processing as a function of a healthy individual's belief in paranormal phenomena.

The present experiment set out to examine associative processing in healthy subjects differing in their belief in and experience of paranormal phenomena. We devised a new task that we will refer to as the BAG (Bridge-the-Associative-Gap) task; it is conceptually similar to Mednick's RAT.[10] On the basis of previous work applying response commonality analysis to verbal fluency data,[22] it was predicted that believers in the paranormal would provide more original associations than would skeptics, and that the believers' association latencies would be shorter than those of the skeptics.[23]

METHODS

Subjects

A total of 352 undergraduate psychology students from the University of Zurich were administered a 6-item questionnaire[24,25] assessing belief in and experience of paranormal phenomena, mainly telepathy, precognition and general extrasensory perception (see Appendix I). The items had to be scored on a 4-point scale. The total score ranges from 0 to 18, denoting strong skepticism and strong belief in paranormal phenomena, respectively. Willingness to participate in a later study on neuropsychological and physiological aspects of belief in extrasensory perception was also asked. One hundred and seventeen students returned the questionnaire and expressed their willingness to participate. Drawing on the 58 subjects in the first and in the fourth quartile of the scale scores, age and educational level-matched subject pairs were formed. However, six subjects were eventually not willing to participate and four were rejected as non-matches, resulting in 24 available pairs; 12 of these pairs were assigned to another study.[26] Thus, 12 subjects scoring in the first quartile (skeptics, mean = 3.0 ± 2.3; six women, six men) and 12 scoring in the fourth quartile of the scale scores (believers, mean = 16.1 ± 1.6; seven

women, five men) participated in the study. All subjects were native Swiss-German or German speakers, and all were right-handed.[27] No subject reported a history of psychiatric or neurological disorders. The study was approved by the local Ethics Committee, and subjects gave informed, written consent. They were paid 40 Swiss Francs for their participation in this experiment and in an electroencephalogram study[28] which was conducted before.

Stimulus material

Eighty word pairs (all nouns) served as stimuli (see Appendix II for the complete stimulus list). The word pairs had originally been prepared for a priming experiment.[26] There were two types of word pairs: 40 pairs were semantically indirectly related, and 40 were semantically unrelated words. In the former stimulus type, the two words were linked to each other by a mediating word (e.g., 'cup' and 'beer' by 'glass'; see Appendix II). The semantic relation between each of the 80 word pairs had previously been rated by 39 independently recruited subjects on a 7-point scale (1 = unrelated, 7 = strongly related). This rating demonstrated a highly significant difference between the 40 indirectly related word pairs (mean = 3.4 ± 0.9) and the 40 unrelated word pairs (mean = 1.7 ± 0.4; paired $t = 10.03$, d.f. = 39, $P < 0.001$). Word pairs in the two types did not differ from one another with respect to word length (between three and seven characters) and frequency of occurrence in German texts.[29] Each word pair was separately printed in Courier New (size: 40 point type) on a 10 × 15 cm card, the two words of a pair being arranged in a vertical array.

To shorten task duration, two separate sets of stimuli, each containing 20 indirectly related and 20 unrelated word pairs, were created. These were carefully matched for the semantic relations between word pairs. The order of administration was counterbalanced across subjects and groups.

Procedure

Subjects received a pack of 40 cards, and were instructed to sequentially turn each card, read aloud the two printed words at their normal reading speed, and to say a third noun (association) which had to be semantically related to both words. Association speed and accuracy were equally emphasized. If no association came to mind, the subjects had the option to answer 'nothing', and to proceed to the next card. The sequence of the cards was newly randomized for each subject. The experiment lasted about 10 min.

Data analysis

An audio tape recorder was used to record all vocal associations; they were transcribed off-line. With the application Creative WaveStudio of Sound Blaster 16 (sampling rate = 44100 Hz, sampling size = 8 bits) subjects' spoken associations were digitized, and the time (in msec) between the second word of each stimulus (offset) and the respective association word (onset) was determined.

For the response commonality analysis, the variables considered were the percentages of three association categories: unique associations (words generated by only one person), rare associations, and common associations. To determine a non-arbitrary cut-off between rare and common associations, the non-unique associations of all 24 subjects were divided into two categories, containing approximately the same number of associations (see reference 22 for further methodological considerations). For each type of word pairs (indirectly related and unrelated), this procedure was applied separately. For indirectly related stimuli, rare associations were those given by two or three different subjects (17% of all associations), common associations were those given by four or more subjects (16% of all associations). For unrelated stimuli, rare associations were those given by two different subjects (7% of all associations), common associations were those given by three or more subjects (7% of all associations).

For the analysis of association latencies, mean individual latencies were computed, separately for each type of word pair and association category. For each stimulus type, associations with a latency of more than twice the individual mean were regarded as outliers and discarded from analysis (11.6% of the latency data).[30]

Statistics

For the response commonality and the latency data, a 3-way analysis of variance (ANOVA) with group (believers, skeptics) as between-subject factor, and stimulus type (unrelated, indirectly related) and association category (unique, rare, common) as within-subject factors were separately run. Greenhouse-Geisser correction was used when applicable. Newman-Keuls tests were used as post-hoc tests. Throughout, two-tailed *P*-values are reported.

RESULTS

Response commonality data

There was a comparable number of omissions ('nothing' responses) for believers (mean = 5.8 ± 5.0)

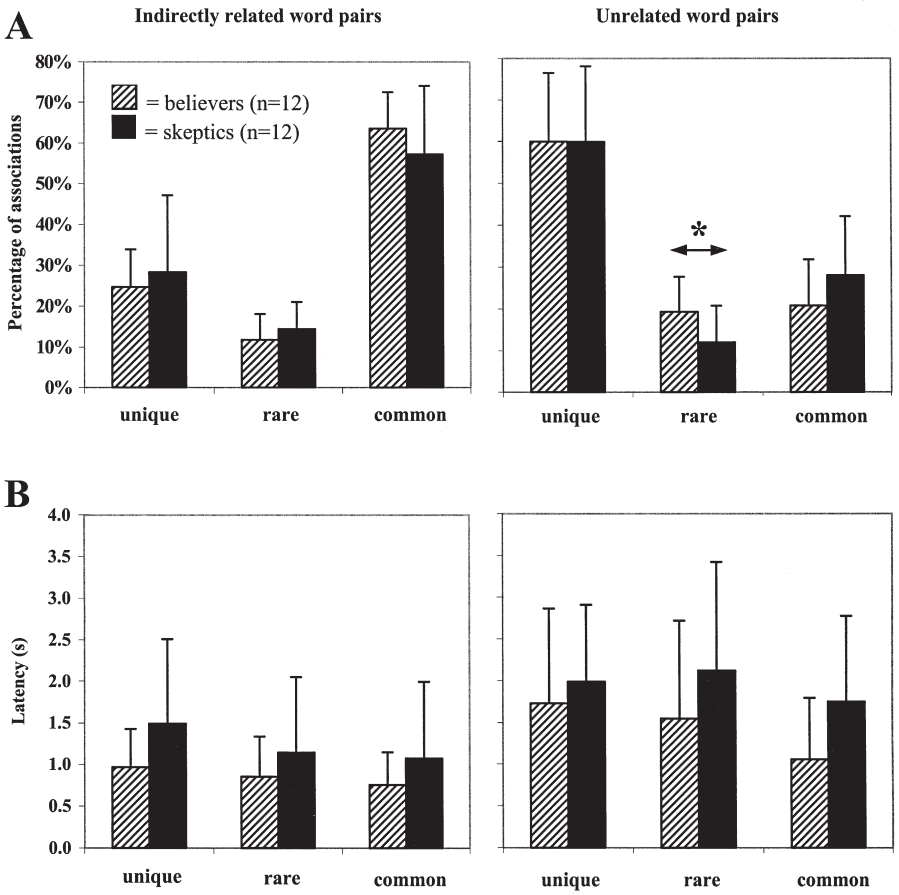

Figure 1. (a) Mean (+1 SD) percentage of associations and (b) mean (+1 SD) association latencies across subjects for each association category (unique, rare, common) and for both subject groups (believers, skeptics), in reaction to indirectly related (left panels) and to unrelated (right panels) word pairs. *$P < 0.05$.

and skeptics (mean = 7.3 ± 4.6; $t = -0.77$, d.f. = 22, $P = 0.45$).

The 3-way ANOVA for valid associations (Fig. 1a) revealed a main effect for association category (unique, 43.3%; ~ common, 42.4%; > rare, 14.4%; $F_{2,44} = 34.76$, $\varepsilon = 0.602$, $P < 0.001$) and an interaction stimulus type × association category ($F_{2,44} = 126.74$, $\varepsilon = 0.833$, $P < 0.001$). The triple interaction group × stimulus type × association category was also significant ($F_{2,44} = 3.89$, $\varepsilon = 0.833$, $P < 0.040$).

To uncover this last effect, 2-way (group × stimulus type) ANOVAs were calculated separately for unique, rare, and common associations. For unique associations, there was only a main effect for stimulus type (indirect, 26.5% *vs* unrelated, 60.0%; $F_{1,22} = 138.02$, $P < 0.001$). For rare associations, the only significant effect was the interaction group × stimulus type ($F_{1,22} = 6.92$, $P < 0.015$). Post-hoc tests showed that (i) believers produced significantly more rare associations than skeptics while reacting to unrelated (19.3% *vs* 12.0%; $P < 0.040$), but not to indirectly related (11.8% *vs* 14.4%; $P > 0.35$) word pairs, and (ii) believers, but not skeptics, gave significantly more rare associations when the word pairs were semantically unrelated rather than indirectly related ($P < 0.050$). For common associations, the main effect for stimulus type (indirect, 60.4% *vs* unrelated, 24.4%; $P < 0.001$) and the interaction group × stimulus type ($F_{1,22} = 6.22$, $P < 0.030$) was significant. Both subject groups gave significantly more common associations to indirectly related rather than unrelated word pairs (believers, 63.6% *vs* 20.7%, $P < 0.001$; skeptics, 57.3% *vs* 28.0%, $P < 0.001$). Moreover, for unrelated word pairs, there was a trend for a higher percentage of common associations for skeptics compared to believers ($P = 0.072$).

Association latency data

Due to coughing or verbalizations prior to a valid association (e.g., 'Wow that's a tough one!'), not every association could be assigned a latency value. However, missing data made up only 1.3% of all associations. The 3-way ANOVA for valid latency data (Fig. 1b) revealed significant main effects for stimulus type (indirect, 1163 msec; < unrelated, 1762 msec;

$F_{1,17} = 12.75$, $P < 0.002$) and association category (common, 1293 msec; < rare, 1476 msec; < unique, 1618 ms; $F_{2,34} = 4.44$, $\varepsilon = 0.773$, $P < 0.030$). The main effect for group fell short of significance (believers, 1124 msec; < skeptics, 1801 msec; $F_{1,17} = 3.30$, $P = 0.087$). No interaction effects approached significance (all F-values < 1.18).

DISCUSSION

We asked subjects differing in their belief in and experience of paranormal phenomena to provide single associations to word pairs (i.e., to bridge an associative gap (BAG) between two words). Compared with Mednick's 'Remote Association Test',[10] the BAG task provides several novel properties. The first is that two stimulus types can be differentiated; the two words either do or do not have a common associate. In addition, all associations provided by the subject are considered valid (i.e., there are no incorrect associations but individual solutions). Thus, rather than the number of 'correct' associations, the originality of every individual association is expressed as a percentage of its occurrence as an association by the entire subject group.[22] In addition to the originality scores, the task allows a chronometrical assessment of individual associations.

The response commonality analysis of the present data revealed that, irrespective of belief in the paranormal, subjects provided more unique associations to unrelated than to indirectly related words but generated more common associations to indirectly related compared to unrelated word pairs. This observation validates the experimental manipulation; the indirectly related words 'primed' subjects to discover the associative bridge between the stimuli. Further validation is provided by the latency data (i.e., associations to indirectly related word pairs were faster than those to unrelated word pairs). In more detail, reaction times for association type followed a linear degradation; unique associations showed longest, rare associations showed medium, and common showed the shortest reaction times. An effect of belief in the paranormal on association frequency was found exclusively for those word pairs which did not contain a readily available associative bridge (i.e., for the unrelated words). Specifically for this stimulus type believers provided more rare associations than did skeptics, while conversely, skeptics tended to provide more common associations. The absence of an effect of paranormal belief in the number of unique associations is in accordance with previous findings[22] and underlines the need to differentiate word responses low in occurrence from those being completely idiosyncratic (i.e., unique to one single person).[31] The fact that the difference in the category 'common associations' did not reach significance may be a consequence of the rather low variance of this variable in both subject groups.[22] With respect to association latencies, believers tended to be faster than skeptics, independent of stimulus type.

On first consideration then, our data seem to confirm the notion, mainly put forward in the parapsychological literature, of a conceptual similarity between creativity and paranormal belief.[32–37] A considerable number of questionnaire studies have indeed reported positive correlations between dimensions of 'paranormal belief' and 'creative personality'.[38–43] However, a remarkably wide range of operational definitions used to identify the 'creative personality' has hampered interpretation of these correlations. Some studies have relied on self-rated artistic creativity,[40] others on external ratings of writing and art projects[39] or on subjects' scores on the Torrance[1] Test of Creative Thinking.[37,39] Still other authors suggested dissociative capacity[41] or sensation seeking traits[39] as relevant measures of creativity. Blackmore and Moore[44] and Brugger *et al.*[45] have therefore abandoned the questionnaire approach and designed perceptual tasks to investigate the cognitive processes underlying the assumed differences in creative thinking between believers and skeptics in the paranormal. Both experiments required subjects to detect patterns against a noisy visual background and found believers more willing to report the presence of a meaningful percept. In terms of signal detection theory,[46] these findings indicated that the believers differed from the skeptics in their response criterion and not in their perceptual sensitivity (d′). In fact, explicit use of signal detection analysis in the context of paranormal or magical belief has formally confirmed this response bias interpretation of the creation of meaning out of ambiguous and unstructured stimulus information[47,48] (see reference 49 for a negative finding).

We propose that signal detection theory may find a useful application also in the field of verbal (rather than perceptual) creativity. With respect to the BAG task introduced here, we suggest to conceive of the 'signal' as a meaningful semantic connection between two words. Viewed from this perspective, our finding of response commonality differences between believers and skeptics should not be attributed to group differences in objective problem solving (corresponding to the d′-measure of signal detection theory), but to differences in response criterion. The fact that believers' associations to unrelated word pairs were more uncommon (in the sense of provided by fewer

subjects of the entire group) neither speaks for nor against a particularly pronounced verbal creativity in Mednick's[10] sense. Rather, the absence of group differences in association to indirectly related word pairs (e.g., 'cup' and 'beer', both linked via the word 'glass') is indicative of a sensitivity (d′) to detect semantic relations, which is comparable for believers and skeptics. However, the believers' higher inclination to give uncommon associations to specifically unrelated words may reflect a lower response criterion to report the presence of a signal, not only in visual, but also in 'semantic noise'.

This signal detection view of the presence/absence of judgments for loose semantic relations may help to elucidate the commonalities between creative thinking, paranormal belief and delusional ideation as described by several independent literatures,[50,51] and as summarized earlier. Subjects who are creative according to some achievement criterion are indeed those with an enhanced readiness to associate to a stimulus with limited objective information content.[5] Likewise, in the 'wonderful domain of mental creativity, which goes by the name of mysticism' (p. 90),[52] and to which we would subsume a paranormal worldview, the personal meaningfulness of a stimulus depends on a subjective evaluation rather than on objectively given criteria. Work with deluded patients, finally, has revealed that in experimentally controlled situations requiring the processing of probabilistic information, these patients need less objective information to reach a conclusion than non-deluded control patients[53,54] (see references 55 and 56 for an explicit signal detection approach to hallucinations and reality monitoring).

One possible interpretation of a generally enhanced reactivity to semantic association is in terms of psychological needs. Malinowski described that Trobriand islanders' superstitious ideas about success in fishing developed exclusively in waters with a very high uncertainty of success.[57] In a similar vein, divinatory practices based on free associations to the Rorschach-like patternings on the burned scapula of a caribou are considered efficient in predicting future hunting strategies where more rationally based hints are not available.[58] In analogy to these ethnological observations it has been argued that paranormal associations in Western civilizations arise as a consequence of external attributions needed to place the blame for any failure outside oneself.[59,60] An identical attempt to explain delusion formation in schizophrenic patients can be found in the psychiatric literature.[61,62] Without intending to doubt the validity of such a predominantly social psychological interpretation in its entirety, we nevertheless note one shortcoming; that is, the failure of the attribution theory to account for the similarities, not only between paranormal and delusional association processes, but also between maladaptive forms of belief and a well-adjusted creative style of reasoning.

We conclude therefore by suggesting an alternative interpretation that accounts for the associative processing characteristics common to thought-disordered patients, believers in the paranormal and highly creative individuals in terms of neuropsychological processes. The technique of indirect semantic priming has been used to demonstrate stronger priming effects for thought-disordered schizophrenic patients than for non-thought-disordered controls[30] (see reference 21 for overview). For instance, a prime word like 'cup' would facilitate a target word like 'beer' more efficiently in thought-disordered patients most likely because of an easier accessibility of some mediating words (e.g., the word 'glass' in the above example). The automatic coactivation of words or concepts only indirectly related to a stimulus was interpreted as reflecting a faster propagation of the spreading activation in the patients' semantic network structure.[63] Loose associations typically giving rise to apophenic attributions could thus be a direct consequence of neurocognitive processes whose functional properties can relatively easy be investigated in a laboratory situation.

A recent twist in this cognitive neuroscience approach to apophenia has been brought about by divided visual-field studies using the paradigm of indirect semantic priming. Weisbrod *et al*. not only replicated the effect of hyperpriming in schizophrenic patients, but concluded from a contrast of left and right visual field data that 'the most pronounced indirect priming effect was found in the right hemisphere of thought-disordered subjects' (p. 146).[64] Very similar conclusions were drawn by Pizzagalli *et al*. who administered a lateralized semantic priming task to an independent sample of healthy subjects who were either strong believers or strong skeptics in paranormal phenomena;[26] this paper reported stronger indirect (but not direct) semantic priming in believers than skeptics, an effect which was confined, however, to left visual field/right hemisphere stimulations. Both Weisbrod *et al*.[64] and Pizzagalli *et al*.[26] interpreted their findings as evidence for a specialization of the right hemisphere for the appreciation of specifically remote associations, a specialization which is in fact suggested by a growing body of data from behavioral (see reference 65 for overview), electrophysiological[66] and neuroimaging experiments.[67,68]

The present study has two major limitations. First, we examined a relatively small number of subjects,

and second, we did not investigate patients with thought disorders. Any conclusion with respect to an association between paranormal belief and thought disorder must therefore remain tentative. However, the predictions with respect to future applications of the BAG task are clearly testable, and the response criterion view of finding associative relationships between stimuli of differing semantic relatedness could help to set some constraints on theories linking creative, paranormal and apophenic styles of thinking. Variations of the BAG task introduced here, preferably adaptations that allow inferences about right hemisphere contributions to semantic–associative processing, may be used in future research both with patient populations as well as with groups of healthy individuals. Such a program for research could help to resolve the apparent paradox of mainly anecdotal reports about similarities between thought processes belonging to opposite ends of a continuum of adaptive behavior.

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Appendix I. Six-item questionnaire assessing belief in and experience of paranormal phenomena (translated from Mischo *et al.*[24]) using a 4-point scale

	Definitively true			Definitively false
I had at least one telepathic experience with another person	❑	❑	❑	❑
I never had any extrasensory perceptions*	❑	❑	❑	❑
I had at least once a presentiment that came true and that I thought was not due to chance	❑	❑	❑	❑
I think telepathy exists	❑	❑	❑	❑
Some dreams refer to future incidences, which cannot be known in advance	❑	❑	❑	❑
I had at least one dream that referred to the future and that came true so exactly that I think it was not due to chance	❑	❑	❑	❑

* Reversed scoring.

Appendix II. Complete list of stimuli of the BAG (Bridge-the-Associative-Gap) task

Indirectly related word pairs German	(Translation)	Unrelated word pairs German	(Translation)
Bein–Schuh	(leg–shoe)	Glut–Saum	(glow–hem)
Käse–Katze	(cheese–cat)	Motor–Schule	(motor–school)
Mähne–Tiger	(mane–tiger)	Mais–Helm	(corn–helmet)
Nadel–Schnur	(needle–string)	Pult–Teig	(desk–dough)
Spinne–Fischer	(spider–fisherman)	Rebe–Zopf	(vine–braid)
Tasse–Bier	(cup–beer)	Schirm–Theater	(umbrella–theater)
Wiege–Greis	(cradle–old man)	Schutz–Note	(protection–grade)
Wolf–Wolle	(wolf–wool)	Stadt–Lauch	(city–leek)
Zirkus–Haus	(circus–house)	Stall–Fahne	(stable–flag)
Meer–Zucker	(ocean–sugar)	Verkehr–Nuss	(traffic–nut)
Blitz–Lärm	(lightning–noise)	Ahnung–Arbeit	(presentiment–work)
Blume–Nase	(flower–nose)	Ausfall–Glocke	(deficit–bell)
Bohne–Tee	(bean–tea)	Bad–Schlag	(bath–blow)
Daumen–Gruss	(thumb–greeting)	Effekt–Bruder	(effect–brother)
Eier–Fuchs	(eggs–fox)	Fach–Ehe	(shelf–marriage)
Herz–Hass	(heart–hate)	Gruppe–Wetter	(group–weather)
Licht–Wachs	(light–wax)	Hafen–Gerät	(port–tool)
Mehl–Wind	(flour–wind)	Jura–Abend	(law–evening)
Pfarrer–Turm	(pastor–tower)	Leiter–Flasche	(leader–bottle)
Schal–Giraffe	(scarf–giraffe)	Blick–Sekt	(look–champagne)
Frau–Onkel	(woman–uncle)	Brei–Pelz	(mash–fur)
Hunger–Hitze	(hunger–heat)	Gnade–Rost	(grace–rust)
Tanne–Ostern	(fir–easter)	Hafer–Ring	(oats–ring)
Puppe–Knabe	(doll–boy)	Horn–Luft	(horn–air)
Amboss–Nagel	(anvil–nail)	Leute–Stück	(people–piece)
Sommer–Schnee	(summer–snow)	Maul–Ferne	(snout–remoteness)
Stier–Milch	(bull–milk)	Physik–Partei	(physics–party)
Storch–Windel	(stork–diaper)	Stich–Sims	(stab–windowsill)
Tag–Schlaf	(day–sleep)	Welt–Heft	(world–copy-book)
Tisch–Lehne	(table–backrest)	Wurm–Sofa	(worm–sofa)
Zwiebel–Trauer	(onion–grief)	Bauer–Leiste	(farmer–ridge)
Hund–Maus	(dog–mouse)	Beamte–Rahm	(civil servant–cream)
Biene–Brot	(bee–bread)	Dorn–Braut	(thorn–bride)
Fisch–Feuer	(fish–fire)	Dose–Foto	(box–photograph)
Jugend–Rente	(youth–pension)	Ferse–Salat	(heel–salad)
Mond–Wärme	(moon–warmth)	Grill–Fabrik	(grill–factory)
Ohr–Brille	(ear–glasses)	Heimat–Leser	(homeland–reader)
Pistole–Ball	(gun–ball)	Krug–Flucht	(mug–escape)
Sand–Zeit	(sand–time)	Pause–Auftrag	(pause–task)
Wüste–Kies	(desert–gravel)	Schädel–Pflanze	(skull–plant)