

Research Paper

Word Association Dynamics and Creativity: A Critical Review of Semantic Distance, Associative Remoteness, and Divergent Thinking

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ABSTRACT

Word association has a long history in psychological assessment and in the study of associative processes, with the Word Association Test (WAT) serving as an important technique for examining the nature, flexibility, and organization of human associations. Although unusual associations have traditionally been examined as potential indicators of psychopathology, the word associative technique also provides valuable insights into associative flexibility, semantic processing, and creativity. This critical review examines evidence related to response entropy, associative difficulty, associative remoteness, semantic distance, and creativity in the context of word associations. Findings suggest that unusual associations are not inherently indicative of psychopathology or creativity and that moderately remote associations may be more informative than either conventional or extremely remote responses. Contemporary research on semantic distance further suggests a nonlinear relationship between associative distance and creative quality. The review highlights the need for broader and culturally sensitive research using the WAT, particularly across diverse linguistic and cultural populations. Future research should integrate culturally responsive word association projective methods with semantic-network analysis and computational methods to enhance the assessment and understanding of associative processes and creativity.

Keywords: *Word association, creativity, semantic distance, divergent thinking, response entropy*

Word association has a long history in psychology as a method for investigating associative processes. Its early development can be traced to the work of Galton in England and Wundt in Germany during the nineteenth century. Cattell and Bryant (1889), while working in Wundt's laboratory, examined the frequency of associations elicited by standardized stimulus words. Kraepelin (1892) subsequently adapted associative procedures to the investigation of psychological processes associated with abnormal behavior.

The application of word association to personality and clinical psychology expanded

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considerably during the early twentieth century. Psychoanalytic approaches emphasized the possibility that verbal associations could reveal underlying needs, conflicts, and emotionally significant material. Jung (1910) developed the association method as a means of investigating emotionally significant complexes. Kent and Rosanoff (1910) subsequently developed a standardized word list based on responses from normal individuals and psychiatric patients, establishing an important normative tradition in word-association research.

Despite its historical importance, the diagnostic utility of word association has remained controversial. Several investigations reported relationships between unusual or emotionally marked associations and psychological disturbance (Brown, 1965, 1970; Hull & Lugoff, 1921; Hundal & Upmanyu, 1974, 1981; Levinger & Clark, 1961; Miller & Chapman, 1983; Upmanyu et al., 1996). Uncommon associations were also investigated as indicators of disordered thought. Chapman and Chapman (1973), for example, reviewed evidence suggesting that individuals with schizophrenia produced fewer common and more individualized associations than control participants.

At the same time, other studies questioned the diagnostic value of word association. Research comparing normal and clinical or deviant groups frequently failed to demonstrate consistent relationships between word-association indices and personality characteristics (Andress et al., 1974; Appelbaum, 1960; Meyers & Brecher, 1941; Tecca & Glassco, 1965). These contradictory findings indicate that the psychological meaning of an unusual association cannot be determined solely from its frequency or rarity.

An important methodological development was the recognition that stimulus characteristics influence response patterns. Laffal (1955) introduced response entropy as an index reflecting the availability and distribution of alternative responses to a stimulus word. Subsequent research demonstrated that associative difficulty also influences word-association performance (Brown, 1965; Hundal & Upmanyu, 1974; Kuntz, 1974). A stimulus that permits numerous alternative responses provides greater opportunity for response variability than a stimulus with a highly dominant association.

These considerations become particularly important when word association is used to investigate creativity. An unusual response may indicate cognitive flexibility and originality, but it may also reflect disorganized or pathological thought. Consequently, unusualness alone cannot be regarded as a sufficient indicator of creativity.

The relationship between word association and creativity has traditionally been explained through associative theories of creative cognition. Mednick (1962) proposed that creative individuals are capable of accessing and combining relatively remote associative elements. Barron (1965, 1969) similarly emphasized unusual associations as an important characteristic of creative functioning. Guilford and colleagues (1951) also identified associative processes as relevant to creative thinking.

Contemporary creativity research has extended this perspective through the study of semantic networks and semantic distance. Rather than treating unusualness as a simple categorical characteristic, recent approaches quantify the conceptual distance between words and ideas. Olson et al. (2021) demonstrated that the semantic distance between spontaneously generated words was associated with creativity, providing evidence that

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semantic distance can serve as an objective indicator of divergent thinking. Beaty and Johnson (2021) subsequently demonstrated the potential of computational semantic-distance methods for automated creativity assessment.

More recent research has challenged the assumption that greater semantic distance necessarily produces greater creativity. Orwig et al. (2025) found a nonlinear relationship between semantic distance and creativity across several divergent-thinking tasks. Creativity ratings increased as semantic distance increased up to an intermediate range, after which additional semantic distance did not produce corresponding increases in perceived creativity. This finding provides an important contemporary explanation for earlier evidence that moderately remote associations may be more closely related to creativity than extremely remote responses.

This convergence between historical word-association research and contemporary semantic-distance research provides a useful theoretical basis for reconsidering the cognitive architecture of associative creativity. Creative cognition may depend not on producing the most unusual association available, but on moving beyond dominant associations while retaining semantic coherence, relevance, and meaningfulness.

The issue is particularly important in multilingual and culturally diverse regional psychology. Much of the foundational word-association literature and a substantial proportion of contemporary semantic-distance research have been developed using English-language materials and samples from Western contexts. Findings obtained in these settings cannot automatically be generalized to the multilingual and culturally diverse region's linguistically and culturally diverse population.

The multilingual and culturally diverse region provides a particularly valuable context for studying associative creativity because multilingualism is widespread and semantic knowledge develops through multiple linguistic and cultural experiences. Word associations may therefore reflect not only individual cognitive characteristics but also language proficiency, educational experience, cultural knowledge, and familiarity with particular concepts. A recent systematic review identified a growing body of research on divergent thinking among multilingual and culturally diverse regional adolescents, but the literature remains more strongly concentrated on educational and conventional creativity measures than on the specific relationship between semantic association and creativity (Sandhiya & Bhuvaneswari, 2024). Similarly, recent research involving adults in Bengaluru found positive relationships among openness to experience, fluid intelligence, and dimensions of divergent-thinking performance, including fluency, flexibility, and originality. Recent international research has demonstrated the feasibility of multilingual semantic-distance assessment, while research in the multilingual and culturally diverse region has increasingly examined divergent thinking and creativity. However, direct empirical research integrating word-association dynamics, response entropy, semantic distance, and creativity among multilingual multilingual and culturally diverse regional populations appears comparatively limited.

The present critical review therefore integrates historical word-association research with contemporary research on semantic networks, semantic distance, and creativity. Particular attention is given to the distinction between creative and pathological unusualness and to the

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implications of linguistic and cultural context for multilingual and culturally diverse regional psychology.

Objectives of the Review

The present review was designed to:

1. Examine the historical and empirical relationship between word association and creativity.
2. Examine the role of response entropy and associative difficulty in interpreting word-association performance.
3. Distinguish creative associative remoteness from unusual associations associated with psychopathology.
4. Integrate traditional word-association research with contemporary research on semantic networks and semantic distance.
5. Identify research gaps in multilingual and culturally diverse regional and cross-cultural contexts and propose directions for culturally sensitive investigations of associative creativity.

METHOD

The present article adopts a narrative critical-review approach. Foundational and contemporary literature concerning word association, associative processes, creativity, psychopathology, response entropy, associative difficulty, semantic networks, semantic distance, divergent thinking, and cultural influences on creativity was examined. Particular attention was given to empirical studies investigating the frequency, unusualness, remoteness, or semantic distance of verbal associations and their relationships with creativity or psychological disturbance. Foundational studies were considered alongside contemporary computational approaches to creativity and recent work addressing multilingual and cross-cultural assessment.

The present article is a narrative critical review rather than a systematic review or meta-analysis. It therefore does not claim exhaustive retrieval of all published research in the field. Its purpose is to critically synthesize major theoretical and empirical developments and identify areas requiring further investigation, particularly within multilingual and culturally diverse regional and multilingual contexts.

Historical Development of Word Association Research

Word association initially served as a method for investigating basic associative processes. Galton's early work and Wundt's experimental investigations established an empirical foundation for examining responses to verbal stimuli. Cattell and Bryant (1889) extended this approach by examining the relative frequency of associations to standardized words. Kraepelin (1892) subsequently used associative procedures in investigations of abnormal psychological processes. The technique later acquired considerable importance within clinical and psychoanalytic psychology. Jung (1910) proposed that disruptions, delays, and unusual responses could provide information about emotionally significant complexes. Kent and Rosanoff (1910) contributed to standardization through the development of a large normative word list.

The historical development of word association therefore involved two overlapping traditions. The first focused on normal associative processes, including response frequency and the organization of verbal associations. The second emphasized clinical interpretation,

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particularly the possibility that unusual or disrupted associations could reveal emotional conflict or psychopathology.

This dual history remains important for contemporary research. A response that is unusual from a normative perspective is not necessarily pathological. It may reflect differences in semantic knowledge, experience, cognitive flexibility, language background, or creativity.

Response Entropy and Associative Difficulty

One of the important methodological developments in word-association research was the recognition that stimulus words differ in their capacity to elicit alternative responses. Laffal (1955) described response entropy as an index reflecting the variability and distribution of responses associated with a stimulus word. When several responses are similarly available, the probability of producing different responses increases. Conversely, when a stimulus has a highly dominant association, response variability is reduced.

Associative difficulty represents a related but distinct characteristic. In word-association studies, researchers have examined associative difficulty through the number of unique responses generated by a stimulus word. Stimuli eliciting numerous unique responses may be considered more difficult because they do not have a single strongly dominant response. These characteristics have important implications for psychological interpretation. If one stimulus permits many possible responses while another strongly favors a single response, differences in response unusualness cannot be attributed entirely to individual psychological characteristics. The stimulus itself contributes to the observed behavior.

Research by Brown (1965), Hundal and Upmanyu (1974), Kuntz (1974), and Upmanyu (1981) supports the importance of considering stimulus characteristics when interpreting word-association performance. Singh (2017, 2026) has likewise emphasized the relevance of response entropy and stimulus-related variability in interpreting the Kent-Rosanoff word association test.

Thus, any attempt to use word association as an indicator of creativity should control for, or explicitly account for, the associative properties of the stimulus words.

Word Association and Creativity

The theoretical relationship between word association and creativity is largely based on the proposition that creative cognition involves establishing relationships among concepts that are not strongly or conventionally connected. Mednick (1962) proposed that creative individuals may be more capable of accessing and combining relatively remote associative elements. Barron (1965, 1969) similarly emphasized unusual associations as an important characteristic of creative functioning. Guilford et al. (1951) identified associative flexibility as relevant to creative thinking.

From this perspective, an uncommon word association may reflect cognitive flexibility and the ability to move beyond dominant responses. However, the relationship is not straightforward because highly unusual associations have also been associated with psychopathology.

Tendler (1945), Rapaport et al. (1946), DeWolfe and Youkilis (1974), and Hundal and Upmanyu (1981) reported relationships between unusual associations and psychological

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disturbance. Chapman and Chapman (1973) likewise documented the relevance of unusual associations to disordered thought in schizophrenia.

The central interpretive problem is therefore that unusualness is psychologically ambiguous. The same observable response may result from different underlying processes. Creative cognition may involve the ability to access remote associations while maintaining meaningful relationships among concepts, whereas pathological responding may involve excessive remoteness, fragmentation, or loss of semantic coherence.

Degree of Associative Remoteness and Creativity

Gough (1976) directly examined the relationship between the degree of unusualness of word associations and creativity. Responses were classified into five categories according to frequency: very common associations, common associations, less common associations, moderately remote associations, and extremely remote associations. Participants included senior engineering students and industrial research scientists. Creativity was evaluated using ratings provided by peers, supervisors, and faculty members.

The results indicated that moderately infrequent responses were more strongly related to creativity than either extremely remote or common responses. This finding has considerable theoretical significance because it suggests that creativity may not simply depend on producing the most unusual response available.

A highly conventional association may be strongly related to the stimulus but provide limited evidence of originality. At the opposite extreme, an extremely remote association may be novel but lack meaningful relevance to the stimulus. A moderately remote association may occupy a functional range in which novelty and semantic relatedness are simultaneously maintained.

This interpretation provides a useful framework for understanding apparently contradictory findings in word-association research. Creativity may involve productive deviation from dominant associations, rather than indiscriminate deviation.

The Associative Basis of Creativity and Psychopathology

Upmanyu and Singh (1984) examined word-association responses as potential indicators of pathological characteristics or creativity. Their findings suggested that extremely unique responses were not a unitary phenomenon. One component was strongly associated with psychoticism, whereas another was positively related to figural originality and moderately unique associations.

This distinction is important because it indicates that the category of "unique response" may contain qualitatively different forms of associative behavior. An extremely unusual response may arise because an individual is able to generate a novel conceptual relationship, but it may also arise because the individual's associative process is poorly constrained. Upmanyu et al. (1996) provided additional evidence for this distinction. Their analysis of word-association emotional indicators in relation to anxiety, psychoticism, neuroticism, extraversion, and creativity indicated that rare but non-bizarre associations were associated with creativity, whereas rare associations characterized as bizarre, isolated, or atypical were more strongly related to psychoticism and psychopathic deviation.

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Contemporary theories of creativity have expanded the traditional concept of word association by examining the organization of semantic memory. Associative theories propose that creative cognition depends partly on the ability to access and combine concepts that are relatively distant within semantic memory.

Bernard et al. (2019) investigated individual semantic networks and their relationship to creative abilities. Using semantic judgment ratings, the researchers estimated individual semantic networks and examined relationships between network properties and creativity. Their findings demonstrated relationships between individual semantic-network characteristics and creativity assessed through divergent-thinking and creative-achievement measures.

Together, these findings suggest that semantic coherence may be a critical moderator of the relationship between unusualness and creativity. Creative associations may be remote but interpretable, whereas pathological associations may be remote in a manner that disrupts meaningful semantic organization.

This work represents an important extension of traditional word-association research. Rather than simply counting unusual responses, semantic-network approaches examine the structure of relationships among concepts. Creativity can consequently be conceptualized as involving flexible access to a broad and interconnected semantic system.

Semantic Distance as a Measure of Divergent Thinking

Olson et al. (2021) examined whether semantic distance between unrelated words could serve as an objective measure of divergent thinking. Their large international study demonstrated meaningful relationships between semantic distance and established creativity measures. This approach shifted attention from categorical classifications of responses toward continuous measurement of the conceptual distance among responses. The development of computational measures has further strengthened this approach. Beaty and Johnson (2021) developed SemDis, an open platform for computing semantic distance, and demonstrated that semantic-distance measures can be used to assess creativity and originality across verbal creativity tasks.

Semantic-distance methods offer several advantages over simple counts of unusual responses. They permit researchers to quantify the degree of conceptual separation between responses and can therefore distinguish moderately remote responses from extremely remote responses. Such measures also provide an opportunity to compare associative performance across participants and tasks using a common quantitative framework. Nevertheless, semantic distance should not be treated as synonymous with creativity.

Creativity generally involves both novelty and appropriateness or meaningfulness. A semantically distant response may be original without being useful, relevant, or interpretable.

Nonlinear Relationship Between Semantic Distance and Creativity

An important development in recent creativity research is the recognition that semantic distance may not have a simple linear relationship with creative quality. Orwig et al. (2025) examined the relationship between semantic distance and creativity

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across alternative-use, question-asking, and metaphor-generation tasks. Their analyses indicated that creativity ratings increased with semantic distance up to an intermediate range, after which additional increases in semantic distance did not correspond to greater perceived creativity.

This finding supports a curvilinear relationship between semantic distance and creative quality. It provides contemporary support for observations made in earlier word-association research. Gough (1976) found that moderately infrequent associations were more strongly related to creativity than extremely remote responses. Upmanyu and Singh (1984) and Upmanyu et al. (1996) likewise distinguished creative forms of unusual responding from extremely unusual or bizarre responses.

The convergence of these findings suggests that creative cognition may involve a functional range of associative distance. At low levels of semantic distance, responses may be conventional and insufficiently original. At intermediate levels, responses may achieve a balance between novelty and meaningfulness. At very high levels, associations may become increasingly difficult to interpret or may lose contextual relevance.

Thus, the objective of creativity assessment should not be to identify the individual who produces the most remote association. Rather, it should be to identify the individual's capacity to generate sufficiently remote but meaningful associations.

Language, Culture, and Creative Associations

The relationship between word association, semantic distance, and creativity should be interpreted within linguistic and cultural contexts. Much of the existing research is based on English-speaking Western samples, limiting its direct generalizability to the multilingual and culturally diverse region, where multilingualism and cultural diversity may shape semantic associations through language proficiency, education, and cultural experience. Although research in the multilingual and culturally diverse region has increasingly examined divergent thinking, personality, and cognitive flexibility, direct evidence linking semantic association with creativity remains limited.

English-based verbal measures may also confound creative ability with language proficiency, highlighting the need for language-specific norms and culturally sensitive assessment. Importantly, associations perceived as remote in one cultural context may be meaningful or creative in another. Therefore, future research should examine whether the structure of semantic associations and the relationship between semantic distance and creative performance vary across the multilingual and culturally diverse region's languages and cultural contexts.

Toward a Cognitive-Cultural Architecture of Creativity

The evidence reviewed in this article supports a cognitive-cultural account of associative creativity. Several processes appear to be involved.

First, individuals must have access to a sufficiently broad range of semantic representations. Second, they must be able to move beyond highly dominant associations. Third, they must be able to establish relationships between relatively remote concepts. Finally, creative responding requires sufficient semantic coherence and contextual relevance. These processes can be represented conceptually as follows:

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Language and cultural experience → Semantic-network organization → Associative activation → Response competition and response entropy → Semantic exploration → Associative distance → Semantic coherence and contextual relevance → Creative performance

Within this framework, response entropy and associative difficulty influence the availability of alternative associations. Semantic distance reflects the extent to which an individual moves beyond dominant associations. Semantic coherence and contextual relevance determine whether the resulting association remains meaningful.

This model also helps explain why unusual associations can be associated with both creativity and psychopathology. Both may involve deviation from dominant associations, but they may differ in the degree to which semantic organization and contextual relevance are maintained.

The model should be regarded as a conceptual synthesis rather than an empirically established causal model. Future research should test the relationships among its components directly.

Implications for Psychological Assessment

The reviewed literature has several implications for psychological assessment. First, unusual word associations should not automatically be interpreted as evidence of psychopathology. Second, extremely remote associations should not automatically be interpreted as evidence of creativity. Third, stimulus characteristics should be carefully controlled when comparing individuals or groups.

Traditional word-association methods may have renewed value when combined with contemporary quantitative approaches. Measures of response entropy, associative difficulty, semantic distance, and semantic-network structure could provide more precise indicators of associative cognition than simple counts of unusual responses.

For creativity research, word association may be particularly useful as a complementary measure of divergent thinking. However, word association should not replace multidimensional approaches to creativity because creative performance involves cognitive, motivational, contextual, and domain-specific processes.

In clinical settings, word-association responses may provide supplementary information about associative organization, but they should not be used as standalone diagnostic indicators. Clinical interpretation should be based on converging evidence from validated psychological measures, clinical interviews, behavioral observations, and relevant contextual information.

For psychological assessment in the multilingual and culturally diverse region, language and cultural equivalence should be treated as essential methodological considerations. Before applying an English-based word-association measure to multilingual populations, researchers should establish appropriate linguistic norms and examine whether response entropy and semantic-distance estimates remain comparable across languages.

Research Gap

The literature reviewed in the present article reveals three major gaps.

1. **Methodological Gap:** Traditional word-association research has frequently treated unusualness as a categorical characteristic, whereas contemporary creativity research increasingly treats semantic distance as a continuous variable. Integrating these approaches may provide a more precise understanding of associative creativity.
2. **Theoretical Gap:** The distinction between creative and pathological unusualness remains insufficiently specified. The available evidence suggests that semantic coherence and contextual relevance may be critical, but these variables have not been sufficiently integrated into traditional word-association models.
3. **Cultural and Linguistic Gap:** Although contemporary research has demonstrated the feasibility of semantic-distance assessment across languages, direct investigation of word-association dynamics, response entropy, semantic distance, and creativity within multilingual populations in the multilingual and culturally diverse region remains comparatively limited.

This gap is particularly important because multilingual populations provide a rich setting for investigating how language and culture shape semantic organization and creative cognition.

Suggestions for Future Research

- Future research should examine the relationships among response entropy, associative difficulty, semantic distance, semantic coherence, and established measures of divergent and convergent thinking within the same participants.
- Cross-linguistic studies should compare word-association performance in English and languages of the multilingual and culturally diverse region while controlling for vocabulary, word frequency, and language proficiency.
- Longitudinal research could investigate whether associative flexibility changes with education, creative training, expertise, or bilingual experience.
- Experimental studies should also examine whether semantic distance and creativity show a nonlinear relationship in the multilingual and culturally diverse region's populations, as suggested by recent international research.
- Computational approaches provide another promising direction. Semantic-distance tools have demonstrated the potential for automated assessment of semantic relationships in creativity research. Multilingual semantic-distance approaches further suggest that verbal creativity can potentially be assessed across languages using comparable computational methods.

Limitations

The present review has several limitations.

- First, it is a narrative critical review rather than a systematic review or meta-analysis. It therefore does not claim exhaustive retrieval of all studies concerning word association and creativity.
- Second, the historical and contemporary literature differ substantially in theoretical orientation and methodology. Early studies relied heavily on response frequency and

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clinical interpretation, whereas recent studies increasingly use computational measures of semantic distance.

- Third, definitions of creativity, unusualness, associative difficulty, and semantic distance vary across studies, limiting direct comparison.
- Fourth, much of the contemporary semantic-distance literature has been developed using English-language materials. Although multilingual research is expanding, evidence concerning languages of the multilingual and culturally diverse region remains limited.
- Finally, semantic distance should not be interpreted as synonymous with creativity. Semantic distance captures conceptual dissimilarity, whereas creativity also involves relevance, usefulness, appropriateness, and contextual value. Recent evidence that creative quality may plateau at higher levels of semantic distance reinforces this distinction.

CONCLUSION

The historical and contemporary literature reviewed in this article indicates that word association provides a valuable window into the associative processes underlying creative cognition. However, unusual associations should not be interpreted as direct indicators of creativity, as similar response characteristics may also occur in psychopathology. Research on response entropy, associative difficulty, and semantic distance further demonstrates that stimulus characteristics can substantially influence word-association performance. Overall, moderately remote or infrequent associations appear to be more informative about creativity than either highly conventional or extremely bizarre responses, suggesting a nonlinear relationship in which creative quality increases with associative remoteness up to a functional range, beyond which excessive remoteness may reduce coherence and relevance. Taken together, these findings suggest that creativity depends on a balance between associative novelty and semantic organization. Creative cognition involves moving beyond dominant or conventional associations while maintaining sufficient coherence, relevance, and contextual meaningfulness. This perspective also highlights the importance of cultural and linguistic context, particularly within multilingual and culturally diverse populations. Because much of the existing evidence is derived from English-speaking or Western populations, findings cannot be assumed to generalize directly across different linguistic and cultural contexts. Although contemporary multilingual research demonstrates the potential for computational approaches to creativity across languages, empirical research examining word-association dynamics, semantic distance, response entropy, and creativity across diverse languages remains comparatively limited.

Overall, word-association methods may serve as a useful complementary approach to understanding creativity when interpreted within an appropriate theoretical and methodological framework. In educational and clinical settings, these techniques may also be used cautiously by psychologists, school counselors and other mental health professionals as part of broader assessment, but their results should never be treated as standalone indicators of either creativity or psychopathology. Ultimately, the study of associative creativity is best understood through the interplay of novelty, coherence, language, and culture.

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