

Do the best design ideas (really) come from conceptually distant sources of inspiration?



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Design ideas often come from sources of inspiration (e.g., analogous designs, prior experiences). In this paper, we test the popular but unevenly supported hypothesis that conceptually distant sources of inspiration provide the best insights for creative production. Through text analysis of hundreds of design concepts across a dozen different design challenges on a Web-based innovation platform that tracks connections to sources of inspiration, we find that citing sources is associated with greater creativity of ideas, but conceptually closer rather than farther sources appear more beneficial. This inverse relationship between conceptual distance and design creativity is robust across different design problems on the platform. In light of these findings, we revisit theories of design inspiration and creative cognition.

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Where do creative design ideas come from? Cognitive scientists have discovered that people inevitably build new ideas from their prior knowledge and experiences (Marsh, Ward, & Landau, 1999; Ward, 1994). While these prior experiences can serve as sources of inspiration (Eckert & Stacey, 1998) and drive sustained creation of ideas that are both new and have high potential for impact (Hargadon & Sutton, 1997; Helms, Vattam, & Goel, 2009), they can also lead designers astray: for instance, designers sometimes incorporate undesirable features from existing solutions (Jansson & Smith, 1991; Linsey et al., 2010), and prior knowledge can make it difficult to think of alternative approaches (German & Barrett, 2005; Wiley, 1998). This raises the question: what features of potential inspirational sources can predict their value (and/or potential harmful effects)? In this paper, we examine how the conceptual distance of sources relates to their inspirational value.

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1 Background

1.1 Research base

What do we mean by conceptual distance? Consider the problem of e-waste accumulation: the world generates 20–50 million metric tons of e-waste every year, yielding environmentally hazardous additions to landfills. A designer might approach this problem by building on **near** sources like smaller-scale electronics reuse/recycle efforts, or by drawing inspiration from a **far** source like edible food packaging technology (e.g., to design re-usable electronics parts). What are the relative benefits of different levels of source conceptual distance along a continuum from near to far?

Many authors, principally those studying the role of analogy in creative problem solving, have proposed that conceptually far sources — structurally similar ideas with many surface (or object) dissimilarities — are the best sources of inspiration for creative breakthroughs (Gentner & Markman, 1997; Holyoak & Thagard, 1996; Poze, 1983; Ward, 1998). This proposal — here called the Conceptual Leap Hypothesis — is consistent with many anecdotal accounts of creative breakthroughs, from Kekule’s discovery of the structure of benzene by visual analogy to a snake biting its tail (Findlay, 1965), to George Mestral’s invention of Velcro by analogy to burdock root seeds (Freeman & Golden, 1997), to more recent case studies (Enkel & Gassmann, 2010; Kalogerakis, Lu, & Herstatt, 2010).

However, empirical support for this proposal is mixed. Some studies have shown an advantage of far over near sources for novelty, quality, and flexibility of ideation (Chan et al., 2011; Chiu & Shu, 2012; Dahl & Moreau, 2002; Gonçalves, Cardoso, & Badke-Schaub, 2013; Hender, Dean, Rodgers, & Jay, 2002); but, some *in vivo* studies of creative cognition have not found strong connections between far sources and creative mental leaps (Chan & Schunn, 2014; Dunbar, 1997), and other experiments have demonstrated equivalent benefits of far and near sources (Enkel & Gassmann, 2010; Malaga, 2000). Relatedly, Tseng, Moss, Cagan, and Kotovsky (2008) showed that far sources were more impactful after ideation had already begun (vs. before ideation), providing more functionally distinct ideas than near or control, but both far and near sources led to similar levels of novelty. Similarly, Wilson, Rosen, Nelson, and Yen (2010) showed no advantage of far over near sources for novelty of ideas (although near but not far sources decreased variety of ideas). Fu et al. (2013) even found that far sources led to lower novelty and quality of ideas than near sources. Thus, more empirical work is needed to determine whether the Conceptual Leap Hypothesis is well supported. Further, Fu et al. (2013) argue there is an inverted U-shape function in which moderate distance is best, suggesting

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