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Research Paper

Inspiration for styling tasks

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Inspiration is vital for designers. This study builds on findings on inspiration examples for problem-solving tasks and extends those to styling tasks by exploring the influence of examples on styling criteria. The generation of inspiration examples in this study is grounded in design literature and practice. This study identifies primary styling criteria (i.e., personality coherence, visual coherence, and originality) to evaluate the design outcome. The results indicate that designers who received near-field examples that communicated an intended meaning compared to designers who did not receive any examples generated concepts with a higher personality coherence yet with a similar level of originality. Also, near-field visual examples increased visual coherence. Thus, different design criteria need specific examples.

Keywords: styling tasks, problem-solving tasks, inspiration examples, design research, design cognition, creativity

Inspiration plays a vital role in supporting designers to generate creative ideas (e.g., Sio et al., 2015). To create new ideas, designers use various sorts of inspiration, such as examples of solutions, visuals of products, and nature or everyday life objects (Cheng et al., 2014; Crilly et al., 2009). Scholars have found that proper examples can facilitate the creative process leading to higher quality results from problem-solving tasks (Sio et al., 2015). However, little is known about how examples can support designers in styling tasks (Jagtap, 2017). Styling tasks are part of broader creative problem-solving design activities in new product development (Person et al., 2016). For instance, the design problem of a device to pick up a book from a shelf is a problem-solving task (Cardoso & Badke-Schaub, 2011), whereas designing the visual appearance of such a device to express playfulness is a styling task.

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The visual appearance of products is key to determining consumer responses and offers opportunities for companies to foster competitive advantage and achieve market success (e.g., Karjalainen & Snelders, 2010). Among its different roles, the visual appearance of products communicates meaning (Crilly et al., 2004) that is related to both symbolic and functional values (Creusen & Schoormans, 2005). For example, angular forms are associated with dynamism and masculinity as symbolic meanings; the large size of a hair dryer can be associated with powerfulness related to the functionality of the product (Creusen & Schoormans, 2005). Intended meanings are a set of meanings related to the products that an organization aspires to create (Philips et al., 2014). This study focuses on styling tasks that seek the expression of intended meanings.

For designers, styling is a central capability and an important rationale for their employment (Person et al., 2016). Styling also contributes to designers' professional recognition (Person et al., 2016). Moreover, the visual appearance of products is key to determining consumer responses and offers opportunities for companies to foster competitive advantage and achieve market success (e.g., Heitmann et al., 2020). Styling contributes to a company's financial profitability and market visibility (Person et al., 2016). Therefore, it is considered strategically important for designers and companies (Person et al., 2007, 2008; Tonkinwise, 2011a, 2011b).

Despite its importance, styling tasks have been relatively neglected in the past and more recent studies (Crilly et al., 2009; Person et al., 2016). In practice, designers often face challenges in the embodiment of intended meaning in a product design (Blijlevens et al., 2009) and the visual appearance of products is often developed based on designers' intuitive judgements and educated guesses (Crilly et al., 2004). To answer the calls for more research on styling tasks (Creusen, 2011; Jagtap, 2017; Person et al., 2016; Verma & Punekar, 2022) by supporting designers' creativity, we explore the following research question in this study: how can inspiration examples affect the quality of styling tasks in the design process?

We conducted an explorative study to answer this pertinent and timely research question. We contribute to the design literature in several ways. First, integrating research findings on problem-solving tasks and styling tasks, this study identifies beneficial examples for styling tasks. Secondly, this study proposes a set of primary styling criteria for evaluating the design outcome of styling tasks, which are absent in the literature (Gemser & Barczak, 2020). Third, this explorative study reveals the influence of modality and conceptual distance of examples on the design outcome of styling tasks, explaining why they are beneficial. Lastly, the results provide insight into the generation and influence of examples that are also commonly used in design practice

(i.e., have high face validity), which makes our results relevant for practitioners, too (Crilly, 2019).

The remainder of the manuscript is organised as follows. We first review existing research to identify primary styling criteria. Second, we present findings on inspiration properties from the problem-solving literature and inspiration sources from the literature stream of product visual appearance design. Subsequently, we review styling-task literature and integrate the literature streams to identify beneficial examples for styling tasks. Third, we present our exploratory study on the effect of the examples on the styling criteria. Lastly, we discuss our findings and implications for the research and practice of styling and problem-solving tasks.

1 Literature review

1.1 Criteria for styling tasks

To define a set of primary criteria that can assess the design outcome of styling tasks, we reviewed the literature stream concerning the communication of intended meaning through product visual appearance. Three main research streams emerged: (1) creating coherence with an intended meaning (Karjalainen, 2007; Karjalainen & Snelders, 2010; McCormack et al., 2004); and (2) creating coherence among the visual elements of a product (McCormack et al., 2004; Phillips et al., 2014); and (3) creating an original appearance (Hekkert et al., 2003; Mugge & Dahl, 2013; Phillips et al., 2014). We discuss below the findings of each research stream and define three styling criteria based on them.

The primary purpose of styling tasks is to communicate an intended meaning (Person et al., 2016). The visual appearance of a product can trigger cognitive and affective consumer responses (Bloch, 1995; Brakus et al., 2009; Crilly, 2004). Consumers derive symbolic meaning from these responses (Van Rompay et al., 2009), such as purity or cheerfulness. For brands, such intended meaning reflects brand characteristics that constitute a brand's personality (Aaker, 1996; Keller, 2013). To foster favourable consumer responses, it is essential to firmly establish the intended meaning in the visual appearance of products (e.g., Keller, 2013). Therefore, it is strategically important for companies to intentionally transform brand personalities in the visual appearance of products (Karjalainen & Snelders, 2010). Personality coherence emerges as the first criterion that evaluates the coherence between an intended meaning and a product's visual appearance.

Consumers integrate meanings connoted across various visual elements, such as logo, shape, and colour into an overall impression when confronted with products. Based on the theory of process fluency, higher coherence among

various visual elements help consumers to form their impressions more easily and contribute to positive consumer response towards the product and brand (Phillips et al., 2014; Van Rompay et al., 2009). On the contrary, when consumers receive mixed signals, for example, when the product shape conveys 'purity' while the typeface connotes 'artificiality', they tend to evaluate the product negatively (Van Rompay et al., 2009). Visual coherence emerges as the second criterion that assesses the coherence among the visual elements of a product's visual appearance.

Original product appearance can draw consumers' attention, which is considered as a precondition for consumers to derive meaning and recognise the brand (Person et al., 2007; Schoormans & Robben, 1997). Originality is the first of the principles of a good design claimed by the iconic industrial designer Dieter Rams (Swan & Luchs, 2011). However, consumers do not always prefer radically new product appearances (Mugge & Dahl, 2013). When a product's appearance is exceptionally original compared to existing ones, consumers may have difficulty categorising it, or it can evoke too much arousal, leading to frustration and dissatisfaction (Hekkert et al., 2003). According to the Most Advanced Yet Acceptable principle (Hekkert et al., 2003), an optimal level of originality is essential to fulfilling changing consumer needs and allows brands to differentiate from their competitors (Blijlevens et al., 2009; Keller, 2013). As originality plays an important role in consumer perception and responses to a product's visual appearance, it emerges as the last criterion for styling tasks. To conclude, in line with these relevant research streams, we use personality coherence, visual coherence, and originality as three primary criteria for assessing the outcome of styling tasks.

1.2 Inspiration properties and inspiration sources

This section first presents findings on inspiration properties from the problem-solving task literature, which explain why examples are beneficial. Then, it discusses findings on inspiration sources from the design for product visual appearance literature stream. In section 1.3, we integrate these findings with styling literature to identify beneficial examples for styling tasks.

Scholars have found that examples can trigger associative thinking and activate related ideas in the memory of designers (Eckert & Stacey, 2000), leading to original solutions (Rietzschel et al., 2007). In a creative process, designers create a search space for relevant inspiration and then transform, combine, or adapt elements of the examples to generate a solution (Sio et al., 2015). When presented with an example, a designer's search strategy may benefit from attention allocation. That is, instead of searching broadly and randomly, an example can allocate a designer's attention to a related domain, narrowing down the search space and facilitating a more in-depth exploration (Sio et al., 2015). For instance, past studies show that designers benefit from images of

various objects, sketches of products (Goldschmidt & Smolkov, 2006), and inspirational texts (Goldschmidt & Sever, 2011) in creating more original concepts than without any examples. However, not all examples have positive effects (Sio et al., 2015), and some can even prevent designers from exploring new ideas, resulting in limited originality and design fixation (e.g., Chrysikou & Weisberg, 2005). The next paragraphs discuss how examples can support or hinder the design process.

Modality and conceptual distance emerge as two essential inspiration properties in supporting the creative design process in problem-solving tasks. Regarding modality, visual and textual examples can benefit or impair design outcomes for different reasons. Empirical evidence shows that exposure to visual examples may increase creativity (e.g., Goldschmidt, 2015). Designers find useful 'clues' in images as a 'trigger' or a 'jumping board' to new solutions (Goldschmidt & Sever, 2011). In general, they have developed a high level of ability (Goldschmidt, 2015) and a preference for visual ways of information processing and communication (Hanington, 2003; Keller et al., 2006). A rich collection of images is demonstrated to enhance the quality of solutions even when designers were not explicitly instructed to use them (Casakin & Goldschmidt, 1999). However, visual examples can also have negative effects. Images of solutions that are too related to a problem domain often provide a higher degree of features and details than textual examples (Chan et al., 2011). Looking at such visual examples is likely to make designers too attached to them, leading to inadequate or excessive repetition of features or details presented (Cardoso & Badke-Schaub, 2011), sometimes even the inclusion of inappropriate features from the solution examples (Jansson & Smith, 1991; Perttula & Liikkanen, 2006).

On the other hand, textual examples that are either closely related or unrelated to the problem domain can enhance the originality of solutions (Goldschmidt & Sever, 2011). These authors assert that words are versatile 'vessels' of ideas that can be interpreted in many ways and "the contemplation of words and phrases leaves a wider manipulation space in the process of translation into visual images" (p. 144). For example, the word 'car' can be associated with a Volvo car, a sports car, an old-timer or a toy with entirely different design characteristics and features. Without too specific references to solutions, words offer designers room for their own interpretations, extend search space, and may help avoid design fixation (Gonçalves et al., 2012; Nagai & Noguchi, 2002). However, one disadvantage of text compared to an image is that information presented in text is generally less efficiently communicated to designers. Therefore, more cognitive effort is required to access, store, transmit and infer information from text than from images (Sarkar & Chakrabarti, 2008; Ware, 2010, p. 107). For instance, abstract keywords that describe a meaning (e.g., soft or humorous) must be deconstructed into more concrete words for designers to retrieve a corresponding visual image (Nagai & Noguchi, 2002).

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Lastly, both modalities seem to have their own strengths depending on the design problem, as some ideas or concepts can be expressed in words but cannot be represented through images, and vice versa (Goldschmidt & Sever, 2011).

Next to modality, conceptual distance is another property that affects the design outcomes. The conceptual distance is determined by the number of shared surface features between an example and a problem domain (Fu et al., 2012). For instance, to create an 'automotive dining' product, the problem domain is dining equipment (Dahl & Moreau, 2002). In this sense, a cup holder and a tray table are near-field examples because they are closely related to the problem domain, sharing many surface-level attributes (i.e., surface features) such as a circle-shaped indentation or a ring to place a cup, with dining equipment. In contrast, a dentist's lamp is a far-field example because it is distantly related to the problem domain and shares no or few surface features with dining equipment. Regarding styling tasks, a real-life example is the design of a Volvo car that communicates 'safety' (Karjalainen & Snelders, 2010). The problem domain of a styling task is creating the visual appearance of a new product that conveys an intended meaning.

The conceptual distance influences the originality of ideas. Dahl and Moreau (2002) asserted that when surface features are mapped and transferred from near-field examples to the solution, the solution is likely to exhibit similarities with the existing ones, resulting in lower originality. As a far-field example does not share many surface features, designers would have to invest more cognitive effort to discover potential similarities of relational structures between the example and the problem domain (Chan et al., 2015). A far-field example is likely to lead to high originality (Goucher-Lambert & Cagan, 2019), only if designers successfully turn such structures into new designs (Gonçalves et al., 2012). However, given the design problem variation, the findings on conceptual distance are somewhat inconsistent. Chan et al. (2015) found that seeking exclusive support from too distantly related examples may be detrimental to creativity. Their results showed that too-distant examples may come with very high initial processing costs that hinder the design process.

As the present study focuses on the visual aspect of products, we turn to the literature on product visual appearance to identify beneficial inspiration sources for styling tasks. Inspiration examples can be found in almost everything. Crilly et al. (2009) suggested four common categories of inspiration sources: similar products (i.e., products from the same category); dissimilar products (i.e., products from a different category), historical products and non-products such as art, natural or everyday life objects. A survey has revealed that design professionals prefer similar and dissimilar products more frequently than works of art and historical products (Jagtap, 2017). Other

scholars have found that natural or everyday life objects are valuable inspiration sources for styling tasks (Eckert & Stacey, 2000; Endrissat et al., 2016). To conclude, similar and dissimilar products and natural and everyday life objects can be useful inspiration sources for styling tasks.

1.3 Inspiration examples for styling tasks

This section identifies beneficial examples for styling tasks. Many scholars have studied how examples affect the design outcome. Most empirical studies stem from diverse disciplines such as architecture (Cai et al., 2010; Casakin & Goldschmidt, 1999), engineering (Christensen & Schunn, 2007; Fu et al., 2012; Howard et al., 2011; Jansson & Smith, 1991; Wilson et al., 2010), and product (system) design (Cardoso & Badke-Schaub, 2011; Chrysikou & Weisberg, 2005; Goldschmidt & Sever, 2011; Gonçalves et al., 2012; Smith et al., 1993; Tseng et al., 2008). So far, the focus has not been on styling tasks yet. To close this gap, we first present styling task research findings in relation to the inspiration sources identified in the previous section. Subsequently, we identify potentially beneficial examples by integrating findings from styling tasks with inspiration properties and inspiration sources. Lastly, we propose expectations concerning the effects of these examples on the styling criteria.

Research on styling tasks shows that similar products benefit personality coherence and visual coherence through design features that refer to intended meaning. Studies show that shape grammar (McCormack et al., 2004) and design cues (Karjalainen, 2007) can be repeatedly applied to support consumers' recognition of the intended meaning and the membership of a product portfolio. A shape grammar is a set of design rules that translates the key elements of a brand into a design 'language' (McCormack et al., 2004). Design cues include geometry (e.g., headlights with wide-open eyes for Toyota cars) or structure (Karjalainen, 2007). For example, the strong shoulder line of the Volvo cars implemented throughout the entire product portfolio helps the company to communicate 'safety' as an intended meaning (Karjalainen & Snelders, 2010).

Furthermore, practitioners use dissimilar products under the same brand as examples in styling tasks. A dissimilar product depicts features representing specific design solutions that refer to an intended meaning. Designers can efficiently identify them and benefit from a 'cross-category' learning effect (Bakker-Wu et al., 2017). Case study results by Bakker-Wu et al. (2017) indicate that a brochure or a display can be inspirational to the design of a new website that communicates the intended meaning and ensures visual coherence with the other products. However, if these features are too product-specific, they can become less flexible for integration into a new product. For instance, defining car features cannot be directly applied to other products, such as

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drink containers (Karjalainen, 2007). Therefore, dissimilar products with features that are flexible for modification could be beneficial for styling tasks.

Next, natural and everyday life objects referring to an intended meaning are also commonly used in styling tasks. For instance, a leaf can be a useful example to convey naturalness because it depicts features such as green colour or organic shapes. When integrated properly into a product, these features can evoke the desired feeling of naturalness (Orth & Malkewitz, 2008). Relatedly, Endrissat et al., 2016 showed through their case study that a mood board with images of natural and everyday life objects can be composed to introduce a specific theme (i.e., a feeling of trust) to the design teams. They found that the mood board enables the creation of various products consistent with the predefined theme, supporting personality coherence and visual coherence.

Lastly, both modalities can support styling tasks. The qualitative results of an education project (Karjalainen, 2007) indicate that keywords (e.g., value for money) that describe a brand personality (e.g., affordable for Toyota) can potentially help to achieve higher personality coherence and visual coherence. Furthermore, creative directors typically employ a short phrase (e.g., a leading principle, presented as text) summarising the brand identity to establish a design direction in styling tasks (Bakker-Wu et al., 2017). To conclude, similar and dissimilar products and natural and everyday life objects closely related to an intended meaning could be useful to support personality coherence and visual coherence in styling tasks. As these examples all share some surface features with the problem domain, they are considered as near-field inspiration based on how conceptual distance is determined (Fu et al., 2012).

For originality, design research reveals that textual (e.g., Goldschmidt & Sever, 2011) as well as visual examples (e.g., Malaga, 2000) can stimulate the creative process leading to more original ideas. Regarding conceptual distance, far-field examples are more likely to help generate original ideas (Dahl & Moreau, 2002; Goucher-Lambert & Cagan, 2019) if the initial processing cost is not too high (Chan et al., 2015). Concerning styling tasks, examples that are far-field to the product that needs to be designed could be useful. Therefore, the inspiration sources included in our study are dissimilar products and natural and everyday life objects.

To connect with design practice (Crilly, 2019), we choose representation forms commonly used by professionals. Studies reveal that inspirational sentences (hereinafter referred to as sentences) (Bakker-Wu et al., 2017; Jagtap, 2017), mood boards (Eckert & Stacey, 2000; Endrissat et al., 2016), and images (Jagtap, 2017) are widely used by practitioners. For this study, we use sentences and mood boards to represent natural and everyday life objects and images to represent dissimilar products. A mood board is a selection of objects that refer to an intended meaning in various ways and depict potentially useful

surface features (e.g., green colour or organic shapes of a leaf) that need to be identified, developed, or combined into a design solution. Compared to an image of a dissimilar product with specific design features, a mood board offers more flexibility for selection, adaptation, and integration. As a textual example, a sentence carries ideas that allow for designer's own interpretation (Gonçalves et al., 2012) and it can be translated into various visual images of objects (Goldschmidt & Sever, 2011). Furthermore, a sentence is considered a far-field example for visual coherence because it does not provide any visual features. Table 1 specifies how three examples for styling tasks will be generated for the following explorative study. Their composition is based on representation forms, inspiration sources, and inspiration properties (i.e., modality and conceptual distance).

Based on the literature review and our theoretical underpinning of the generated examples, we expect examples from both modalities (i.e., textual or visual) to contribute to a higher personality coherence, because of their near-field conceptual distance. A mood board and an image may help designers achieve more visually coherent concepts, being near-field, while the far-field sentence cannot achieve this. Moreover, we expect all generated examples to enhance the originality of the design outcome, as they are all far-field. Without any examples, designers may not benefit from attention allocation; therefore, we expect lower-quality design outcomes for all styling criteria when no example is provided.

2 Method

We conducted an explorative study to investigate how can inspiration examples affect the quality of styling tasks according to the styling criteria. The study compared a participant group without any examples with three groups that each received a different example. To enhance generalizability, we used two design briefs for different products. The design task asked participants to develop a concept, either without an example or with an example (i.e., a sentence, a mood board or an image) that is created for the specific design brief. Thus, participants were randomly assigned to one of the eight design tasks.

Table 1 Composition of beneficial inspiration examples for styling tasks

Example's representation form	Inspiration source	Modality	Conceptual distance		
			Personality coherence	Visual coherence	Originality
Sentence	Natural and everyday life	Textual	Near-field	Far-field	Far-field
Mood board	Natural and everyday life	Visual	Near- field	Near-field	Far-field
Image	Dissimilar product	Visual	Near-field	Near-field	Far-field

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2.1 Participants

In line with the majority of the design research studies (e.g., Sio et al., 2015), we selected design students as participants in our study. Two hundred and fifty-two bachelor students consented to participate. The rationale for this selection of participants, as opposed to professionals, was based on the postulation that examples similarly impact novices and experts in that they can confine search fields and enhance the quality of ideas by stimulating more in-depth exploration based on a meta-analysis of 43 problem-solving tasks (Sio et al., 2015). Next, as experts may have developed into different expertise areas, they are likely to have become competent in a particular situation while being beginners in another (Gonçalves et al., 2014; Lawson & Dorst, 2009). This difference in expertise area may influence design outcomes, blurring the effect of the examples. On the other hand, bachelor students may have a more similar, homogenous level of design expertise regarding the styling tasks in our study compared to experts. In conclusion, bachelor students are considered suitable for our study, and the results are valuable for design professionals to understand the influence of the examples.

2.2 Material

We used styling tasks for a product display and a product packaging in the design briefs because they are considered essential visual communication vehicles for intended meaning (Ailawadi et al., 2009; Karjalainen et al., 2010; Orth & Malkewitz, 2008). To stimulate participants to generate a concept based on their own creativity rather than copying from existing brands, we developed two non-existing brands with logos, names, and personalities, each in a different product category. The design requirements were personality coherence with the intended meaning, visual coherence with the brand logo, and originality. For visual coherence, we required participants to design concepts with a similar graphical (i.e., graphical visual coherence) and three-dimensional (i.e., 3D visual coherence) style to the logo. Figure 1 shows the two design briefs.

To generate inspiration examples, we chose a website as a dissimilar product because it is highly effective in communicating intended meanings (Keller, 2009). Therefore, an image of a website can consist of beneficial surface features for both briefs. Two master students developed the sentences, mood boards, and images of websites (see Figure 2) according to the inspiration sources and properties specified in Table 1. Next, we evaluated the examples and concluded that they were near-field for personality coherence and visual coherence. This approach aligns with the existing studies where the researcher (Gonçalves et al., 2012) or PhD students (e.g., Chan et al., 2011) developed examples and evaluated the conceptual distance. Additionally, we administered a survey with 18 participants who have no experience with styling tasks. We asked them to indicate on a scale from 1 (strongly disagree) to 7 (strongly

Design exercise

Design a display concept for the new dishwasher tablet brand 'Moment' (see picture on the right). A display is a three-dimensional object that supermarkets use to promote new products and it usually contains several products.

The following primary requirements apply. The display concept must…
1. be designed in a **similar graphical and 3D design style as the brand logo**.
2. express the brand personality: **natural, cheerful and relaxed**.
3. be **original**, to help the brand to differentiate from other supermarket displays.

Design exercise

Design a packaging concept for the new headphone brand 'Music'.

The following primary requirements apply. The packaging concept must…
1. be designed in a **similar graphical and 3D design style as the brand logo**.
2. express the brand personality: **adventurous, technical and outdoorsy**.
3. be **original**, to help the brand to differentiate from other headphone brands.

Figure 1 Design briefs for the participants: display (top) and packaging (bottom)

agree) to which extent they disagree or agree with the following statements: "The inspirational sentence (mood board, website) and the brand seem to have a shared personality" and "The mood board (website) and the brand logo appear to exhibit the same graphical and 3D design style". As the sentences did not contain any visual design element, visual coherence was not applicable. Table 2 presents the mean values of personality coherence and visual coherence of the examples. T-tests were performed to test differences between the example's mean values and the midpoint of the scale. The mean values were significantly higher than 4, suggesting that the examples were appropriate for the study.

Without clear guidance from the literature, we employed another pre-test to estimate the task duration. Fourteen design students who had not been involved before were asked to perform the design tasks with the examples. A duration of 17 min seemed sufficient for participants to develop a final concept that fulfilled the styling criteria. When working too long on a problem,
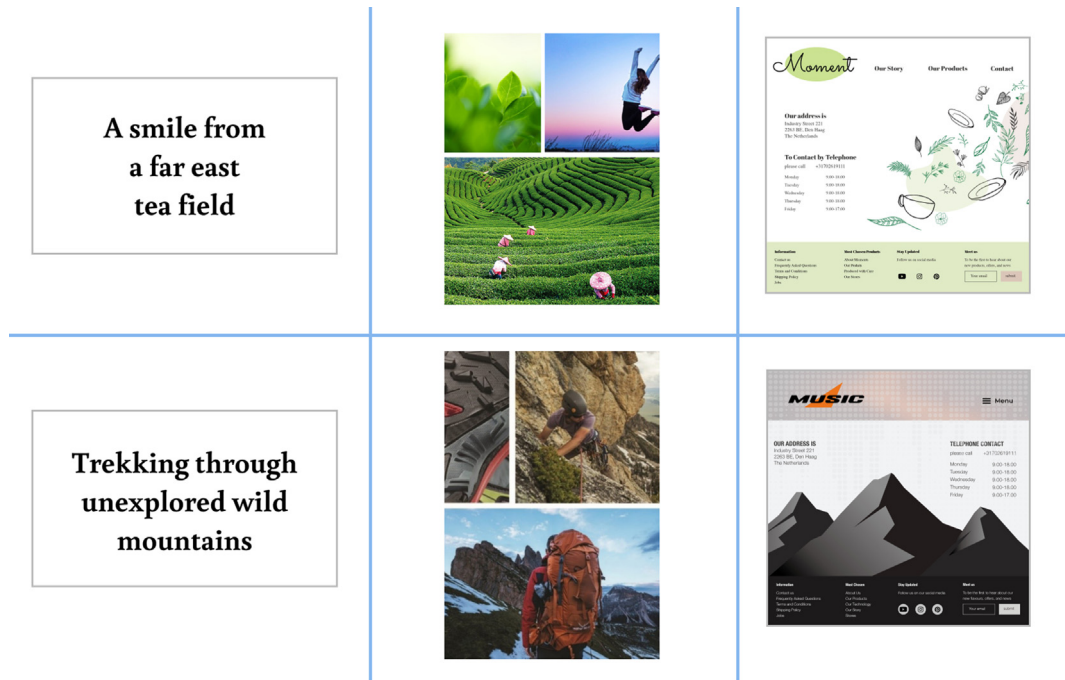
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Figure 2 Inspiration examples used in the study: sentence (left), mood board (middle) and website (right) for design briefs display (top) and packaging (bottom)

Table 2 Mean values of personality coherence and visual coherence of the inspiration examples

	Sentence	*Mood board*	*Image*
Display design brief:			
Personality coherence	4.94 ∗∗(1.21)	5.33∗∗ (1.38)	6.33∗∗ (0.91)
Visual coherence:	n/a	4.61∗ (1.42)	6.11∗∗ (1.08)
Packaging design brief:			
Personality coherence	5.00∗∗(1.33)	5.11∗∗(1.28)	5.61∗∗(1.09)
Visual coherence:	n/a	5.17∗∗(1.25)	5.72∗∗ (1.18)

Standard deviation in brackets, one-tailed ∗p < 0.05; ∗∗p < 0.01.

the sunk cost effect is likely to occur, making the designer more reluctant to modify his/her solution (Sio et al., 2015). As extra time does not necessarily improve the quality of the concepts, we considered 17 min sufficient for our study. Lastly, follow-up interview results with the participants indicated they found the design tasks clear and the examples helpful.

2.3 Procedure
The study was conducted through three successive online sessions, with about 100 participants per session. All participants had the same amount of time to complete the design task in their own working or living environment and

received the same pre-recorded instructions. At the start of the session, the participants were given a short introduction in which they were asked to read the design task carefully, generate as many ideas as possible and develop the final concept based on their best ideas, ensuring that all design requirements were met. After that, they received an online Qualtrics survey link that randomly assigned them to one of the eight design tasks. After uploading a picture of the final concept, they answered a participant survey about their personal preferences for the examples. Figure 3 shows a few concepts developed by the participants.

2.4 Assessment and survey

2.4.1 Expert assessments

In line with similar studies (e.g., Cheng et al., 2014), two brand design experts who were not involved in the design task creation assessed the concepts developed by the participants according to the styling criteria of personality coherence, visual coherence and originality. They both have Master's degrees in Industrial Design Engineering and more than five years of working experience as creative designers for brands and are part-time lecturers, which made them capable of assessing students' work for styling tasks.

To assess the concepts, the experts received the design briefs without examples and black-white prints of the concepts in a randomised order. Thus, they were
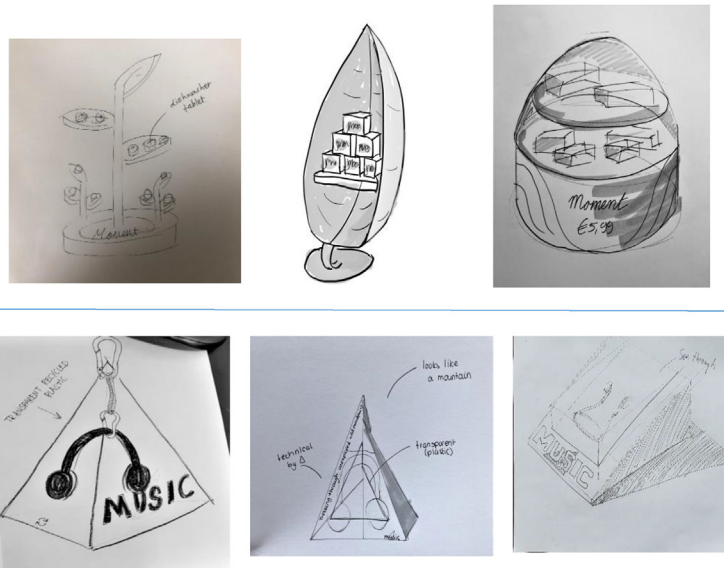

Figure 3 Examples of concepts developed by participants: display (top) and packaging (bottom)

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blind to the examples used by the participants. They assessed one criterion in each session individually to avoid a halo effect. After the assessment, the experts discussed and agreed on concepts that were disqualified as a display or packaging. These concepts were excluded from further analysis.

To assess the personality coherence and visual coherence, we used the following statements: "this display (packaging) concept has the same personality as the brand" and "this display (packaging) concept and the brand logo have a similar graphical (3D) design style". Similar to prior studies on the effect of examples (Cheng et al., 2014; Goldschmidt & Sever, 2011; Goldschmidt & Smolkov, 2006), we asked the experts to assess the originality of the concepts according to the statement: "This display (packaging) concept is original". All scales ranged from "strongly disagree (1)" to "strongly agree (7)". Instead of filling in a score on the prints of the concepts, the experts were instructed to make seven clusters of concepts ranging from score 1 to 7. This approach encouraged them to compare the concepts within one cluster or between clusters more often, made modifications easier, and supported a more consistent assessment.

2.4.2 Participant survey

To further explore and understand which example was typically preferred from a designer's perspective, we asked participants to compare all examples after completing their individual design tasks. We asked, "based on your design expertise, which inspiration would help you most in meeting the following design requirements (i.e., personality coherence, graphical visual coherence, 3D visual coherence and originality)?".

3 Results

3.1 Expert assessment

The inter-rater agreement between the two experts was calculated with Pearson's correlation coefficients (see Table 3). As significant correlations were found for all items (all $r > 00.61$), the averages of the two expert scores were used to assess the concepts in terms of the styling criteria. To investigate the effect of the examples, we conducted two-way ANOVAs with design tasks (i.e., no example, sentence, mood board, and an image) and design briefs (i.e., display and packaging) as independent variables. A significant main effect of the design briefs was only found for originality; thus, no overall difference in personality coherence, graphical visual coherence or 3D visual coherence was found between the two design briefs (all $F < 00.67$, $p > 0.05$). For originality, the packaging concepts were evaluated as more original than the display concepts ($F (1, 213) = 14.45$, $p < 0.01$, Mdisplay $= 3.20$, SD $= 1.31$ vs Mpackaging $= 3.94$, SD $= 1.55$). No interaction effects were present between design tasks and design briefs (all $F < 1.30$, $p > 0.05$), and thus, similar

Table 3 The inter-rater agreement between two design experts

Styling tasks criteria:	r
Personality coherence	0.69[a]
Graphical visual coherence:	0.61[a]
3D visual coherence:	0.63[a]
Originality	0.67[a]

[a] Correlation is significant at the 0.01 level (2-tailed).

patterns were observed for both design briefs on all styling criteria. Table 4 presents the means and standard deviations of the styling criteria for the examples.

For personality coherence, the results showed a main effect for the design tasks ($F_{(3, 213)} = 6.89$, $p < 0.01$). Post hoc tests revealed significant differences between the design tasks without or with an example (sentence: mean difference = -1.09, $p < 0.01$; mood board: mean difference = -1.14, $p < 0.01$; and image mean difference = -1.04, $p < 0.01$). The effect of the design tasks on graphical visual coherence was not significant ($F_{(3, 213)} = 1.07$, $p > 0.05$). The results also showed a main effect of the design tasks on 3D visual coherence ($F_{(3, 213)} = 4.11$, $p < 0.01$). A post hoc test only revealed significant differences between the design tasks without an example and design tasks with mood boards (mean difference = -0.78, $p < 0.05$) and between design tasks without an example and design tasks with images (mean difference = -0.83, $p < 0.05$). These results showed that participants who received design tasks with examples designed concepts with higher personality coherence than those who did not receive any examples. Secondly, the visual examples (i.e., mood board and image) helped to generate concepts with higher 3D visual coherence. For originality, the results showed no significant differences between the participant groups ($F_{(3, 213)} = 00.92$, $p > 0.05$). All groups without or with examples designed concepts with a moderate level of originality (around 3.5).

3.2 Participant survey

Table 5 shows the percentages of participants who would prefer an example given a specific styling criterion. For personality coherence, the mood boards

Table 4 Mean values of the styling criteria

Styling criteria:	No example		Sentence		Mood board		Image		F-value
Personality coherence	2.75	(1.55)	3.84	(1.53)	3.89	(1.60)	3.79	(1.46)	6.89[a]
Graphical visual coherence:	2.86	(1.22)	3.07	(1.22)	3.20	(1.35)	3.27	(1.27)	1.07
3D visual coherence:	3.06	(1.28)	3.54	(1.36)	3.84	(1.61)	3.89	(1.21)	4.11[a]
Originality	3.35	(1.44)	3.72	(1.50)	3.46	(1.56)	3.75	(1.39)	00.92

[a] $p < 0.01$; Standard deviations are in between brackets.

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Table 5 Participants' preference for a specific example per styling criterion

	No example	*Sentence*	*Mood board*	*Image*
Personality Coherence	2%	8%	55%	35%
Graphical visual coherence:	11%	3%	11%	75%
3D visual coherence:	11%	6%	27%	57%
Originality	9%	17%	51%	23%

(55%) and the images (35%) together counted for 90% of the participants. Regarding graphical visual coherence, the images (75%) were the most preferred option, while as for 3D visual coherence, the images (55%) were the first choice and the mood board (27%) the second. Lastly, for originality, the mood board (51%) and the images (23%), accounting for 74%, were still the most preferred examples. In general, participants seemed to prefer visual examples over textual examples or no inspiration for styling tasks, which is consistent with the literature (Keller et al., 2006).

4 Discussion

Inspiration is vital for designers. So far, scholars have mainly investigated how to use examples to support designers in problem-solving tasks. However, styling tasks, as an important part of problem-solving tasks, have received relatively little attention. As the first step to exploring this untapped research field and stimulating designers' creativity in styling tasks, this study extends current research by providing an understanding of the influence of examples on design outcomes. More specifically, we explored the effect of modality and conceptual distance of the examples on the design outcomes according to three styling criteria: personality coherence, visual coherence, and originality.

Our results indicate that for personality coherence and 3D visual coherence, all participant groups that received near-field examples scored higher than those that did not receive any examples. The examples being closely related to the problem domain helped narrow down the search space and stimulate a more in-depth search for ideas. This conclusion is in line with the findings of problem-solving tasks on the positive effect of attention allocation (Sio et al., 2015) and that near-field examples can improve more design characteristics than far-field examples (Chan et al., 2015; Goucher-Lambert & Cagan, 2019). Additionally, the participant survey outcomes provide partly support, where the mood boards and the images as near-field examples were the most preferred options for both criteria.

Furthermore, as expected, participants who received the sentence as a far-field example for visual coherence designed concepts with similar scores as participants without examples. Moreover, we anticipated a positive effect as the

mood board and the image were near-field examples for this styling criterion. However, we found no difference in graphical visual coherence between the participant groups. Graphical visual coherence captures visual similarity through design elements such as logos, shapes, and styles (Phillips et al., 2014). According to both design experts, the correct inclusion of the brand logo in the concept design was a critical contribution to graphical visual coherence. Therefore, concepts with logos of which the styles were poorly resembled (e.g., a wrong typeface) and concepts without a logo received lower graphical visual coherence scores, damping the potentially positive effect of the mood board and image.

As for originality, no differences were found between the participant groups either. This unexpected result differs from findings on problem-solving tasks in that far-field examples may improve the originality of the ideas (e.g., Goucher-Lambert & Cagan, 2019). This result can be related to the fact that originality was presented as the last design criterion in the brief. The participants might have paid less attention to this aspect. Another explanation is the path of least resistance. Searching for surface features that can benefit personality coherence and visual coherence requires less effort than searching for relational structure similarities that enhance originality. As using far-field examples comes with high initial processing costs (Chan et al., 2015), participants may avoid them, which results in similar scores for all participant groups on originality.

There are several directions for future research to enhance originality in styling tasks. Cheng et al. (2014) demonstrated that partial photographs of existing products encourage design students to put more effort into solving incomplete information, resulting in more original visual appearances of products. One direction for future studies is to explore whether partial pictures of styling examples can encourage designers to overcome the barrier of high initial processing costs, improving originality. Furthermore, we expect that far-field examples for originality may be more beneficial for experts. Experts may have lower initial processing costs (Chan et al., 2015) compared to novices. Therefore, they can connect concepts more effortlessly, turning far-field examples into original ideas (Moss et al., 2006). The second direction of future studies is to investigate whether the examples used in the present study can help experts achieve higher originality work. The last direction is related to the commonness of examples. Chan's et al. (2011) study shows that the combination of far-field and less common examples can increase originality. According to these authors, commonness refers to "how common the designs are found in designers' worlds". Examples used in our study were quite common ones. Future studies can explore whether less common examples can increase a designer's effort to create more original ideas in styling tasks.

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Problem-solving studies show that near-field examples can induce design fixation, impairing the originality of designs (Jansson & Smith, 1991; Perttula & Liikkanen, 2006). Regarding styling tasks, we expect design fixation to occur under similar conditions, that is, when the provided examples are too closely related to the problem domain. In Karjalainen's (2007) study, the participants rarely transferred any existing car features to a new product category (e.g., drink container) for the same brand. This finding may indicate that too product-specific features (e.g., the strong shoulder of a Volvo car) cannot support the creation of a dissimilar product in a styling task. In our study, the features presented in the images of a dissimilar product (i.e., a website) were beneficial because they were not too specific for a product category and could be easily modified. At the other extreme, examples are likely to become detrimental when they are too distantly or not related to the problem domain (Chan et al., 2015). Lower personality coherence and visual coherence scores can be expected when examples are not related to the intended meaning.

We contribute to the literature in several ways through our empirical findings. First, we connect findings on problem-solving tasks with the design of product visual appearance and identify beneficial examples for styling tasks. The examples used in this study were generated according to research findings based on expert interviews, case studies and surveys of design professionals. They are also widely used by design professionals, answering the call for more connection with the design work of the real world and more diverse research methods (Crilly, 2019). Second, we specify a primary set of styling criteria to evaluate the design outcome, which had not been identified before. Third, we provide initial evidence that attention allocation in a related problem domain can help designers achieve better results for personality coherence and visual coherence in styling tasks. Interestingly, our results also suggest that textual inspiration seems equally effective as visual inspiration regarding personality coherence. In contrast, the participants overwhelmingly preferred the mood board (55% for personality coherence and 51% for originality) over the sentence (8% for personality coherence and 17% for originality). This result is consistent with the finding that the influence of textual examples is underestimated (Gonçalves et al., 2012). Lastly, our examples did not include existing product features as described in current styling task approaches (Karjalainen, 2007; McCormack et al., 2004). They provide a new way to express intended meanings for non-existing products and products across different categories.

This study has several implications for design research. Unlike existing research on problem-solving tasks, the present study distinguished differences in conceptual distances of examples through the lens of different styling criteria. The results indicate that the initial processing cost might influence the effect of attention allocation. Thus, when designers receive examples, they may first or only use them for the design criterion that is closely related

to. For a more distantly related criterion, designers may need more stimulation to overcome the barrier of high initial processing costs or use a near-field inspiration with a lower initial processing cost. This study showed that a design task can encompass various design criteria, and one example may not help designers sufficiently fulfil all design requirements.

This study also has several implications for practitioners. First, we recommend that designers and their clients collaboratively select and craft inspiration examples. The examples can be used as boundary objects (Carlile, 2002; Endrissat et al., 2016) to create alignment in concept generation and selection and to enhance the personality coherence and visual coherence of various products under the same brand. Second, sentences, mood boards or images are often combined in design practice to provide multiple inputs for styling tasks. However, Sio et al. (2015) predicted that the simultaneous use of multiple examples may inhibit designers from searching deeply, resulting in a diffused search. To benefit from attention allocation, we recommend designers to use just one example at a time based on our findings. Third, practitioners invest considerable time and effort in composing mood boards or formulating inspirational sentences (Bakker-Wu et al., 2017). When facing time constraints, an image of dissimilar products from the same brand can be an excellent alternative to support the creative process. Fourth, the three styling criteria identified in this study can bring clear focus during the ideation and selection of concepts for design teams. Lastly, regarding the underestimated textual examples, the implication for practitioners and design education is to be aware of the existing preferences and to experiment with less familiar types of examples to broaden the repertoire of tools in a design process.

The explorative character of our study also brings some inevitable limitations. Design decisions on form, function and technology are intertwined (Dormer, 1993; Lawson, 2006). Depending on the specific design task, these aspects can have varying importance to the design outcome. Our aim was not to comprehensively cover all visual design aspects but to focus on styling tasks with an emphasis on communicating the intended meaning. Furthermore, there are numerous ways to devise examples using the same sources and representation forms as in our study. Our findings are limited to the particular examples used in this study and cannot predict outcomes of other examples on styling tasks in general.

5 Conclusion

Our study reveals how inspiration examples can support designers' creativity in styling tasks. Drawing on findings on styling and problem-solving tasks, we generated examples based on different inspiration properties (i.e., modality and conceptual distance), sources (i.e., nature and everyday life objects and dissimilar products) and representation forms (i.e., sentences, mood boards

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and images). To assess the design outcomes, we identified three primary styling criteria that had not been specified before: personality coherence, visual coherence, and originality. We conducted an explorative study with two hundred and fifty-two participants assigned randomly to two different design briefs, either without an example or with one of the examples. Two design experts assessed the concepts individually. Our results indicate that near-field examples can stimulate attention allocation, improving personality coherence. Furthermore, near-field visual examples can improve visual coherence in styling tasks. These findings are in line with the positive effect of near-field inspiration (i.e., feasibility and usefulness) revealed in problem-solving tasks. While more research is still needed to understand how to improve the originality of the ideas, our study suggests that developing and using examples can be considered an essential ingredient for successful styling tasks. With our study, we seek to stimulate further discussion and research that supports creativity for styling tasks.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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