



The natural preference in people's appraisal of light



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ABSTRACT

The natural preference refers to the human tendency to prefer natural substances over their synthetic counterparts, for example in the domains of food and medication. In four studies, we confirm that the natural preference is also operative in the domain of light. Study 1 confirmed that *natural* has a consistent meaning when people apply it to light, and that the source (e.g., daylight vs. electrical) and the transformation of the light (e.g., daylight through a blinded window) affects its naturalness. Studies 2 and 3 employed a classic forced-choice decision making paradigm. Study 2 did not confirm the natural preference hypothesis, probably because the artificial option had clear functional benefits over the natural one. Controlling for this confound, our hypothesis was confirmed in Study 3. In Study 4, three light sources were appraised in a randomized experiment. We confirmed that beliefs regarding the effects of light on health and concentration mediate the naturalness–attitude relationship; thus confirming instrumental motives behind the natural preference. Studies 2 and 4, however, suggest that the lower functionality of daylight-based systems may outweigh their perceived instrumental benefits. The weak and statistically non-significant correlations between connectedness to nature and light appraisals in Study 4 speak against an ideational basis for the natural preference as seen in earlier studies. Taken together, our studies provide evidence for a natural preference to be operative in the domain of light.

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1. Introduction

In an interview, the German light designer Ingo Maurer expressed his dismay regarding the European ban on the incandescent light bulb: “*The incandescent light bulb, same as the sun, emits light by means of heating. In its warm glow all colors are reproduced, people look healthier, food tastes better, and one gets tired less easily. Now we are stuck to energy saving lamps and other types of synthetic light*” (Hollands Diep, 2009/2010; p. 158). Interestingly, the light emitted by an incandescent light bulb is here preferred over that emitted by modern energy saving lamps as the former is regarded as less artificial than the latter. A similar preference for products that are perceived as natural exists in other domains, including food and medication. In these domains, a natural product is one that is directly taken from nature; with little to no processing, and without contagion by synthetic materials (Rozin, 2004, 2005).

The preference for natural products may in some cases lead to unfortunate decisions. For example, it may lead people to decide against vaccination by synthetic drugs, opting instead for more natural, but less effective treatments (DiBonaventura & Chapman,

2008). Similarly, the natural preference may lead people to buy products that are packaged in natural materials, such as a wooden or cardboard box, because they expect these packages to have a lower impact on the environment than their more synthetic counterparts (Scholten & Midden, 1997). Often however the opposite is true. Polyethylene bags, for example, have a lower environmental impact than cardboard boxes: The production process is cleaner, and less material is needed for polyethylene bags than for cardboard boxes. In the present studies, we will investigate whether the natural preference is also operative in people's appraisal of light as emitted by natural and electrical light sources, focusing in particular on office lighting.

In the normative decision making literature, the tendency to prefer natural products (e.g., a drug extracted from plants) when it is identical to or worse than its synthetically produced counterpart is called the naturalness bias (e.g., DiBonaventura & Chapman, 2008). It is considered to be a cognitive bias as naturalness-based decisions are not made in a strictly rational manner. To use the label naturalness bias, however, one must assume scientific consensus that the synthetic product or substance is indeed equal to or better than the natural one. Moreover, it must be assumed that the general public has access to this knowledge. Much is known about how lighting affects our health, performance, and mood, but it would be wrong to claim that a scientific consensus exists on, for

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example, the effects of different light sources on office workers. Although the visual effects of light are rather well understood, research has just started to uncover the non-visual effects of light on, for example, health (see e.g., Boyce, 2012) and office work (see e.g., van Bommel, 2006). Moreover, most of the research on the effects of office lighting has been conducted in the laboratory, often using extreme lighting conditions (de Kort & Smolders, 2010). In the present manuscript, we will therefore avoid the term naturalness bias, and use the more neutral term natural preference instead.

In general, two different, but arguably related, explanations for the natural preference have been raised in the literature: One ideational, the other instrumental (e.g., Li & Chapman, 2012; Rozin et al., 2004). The instrumental explanation is that people prefer natural products and substances because they are believed, whether correctly so or not, to be functionally superior; more effective, better for our health, safer, tastier, and less damaging to the environment. Consistent with our expectation that there exists a natural preference in lighting, the scarce research on people's beliefs about light and light sources suggests that natural daylight, but also light from electrical daylight simulators, is regarded to be superior to conventional electrical light in many respects: It is better to work under, it makes people happier, and it is less detrimental to one's health (Veitch, Hine, & Gifford, 1993; also Veitch & Gifford, 1996). Moreover, such lighting beliefs are found to be correlated with people's preferences for, and general attitudes toward light sources, as well as with actual purchasing behavior (Beckstead & Boyce, 1992).

The ideational explanation for the natural preference is that people prefer natural products and substances because they are morally superior to synthetic ones; superior simply because they are natural. Rozin et al. (2004) have argued that this ideational motive behind the natural preference has an evolutionary basis, referring to Wilson's (1984) notion of biophilia. Because our species was dependent on, and intertwined with nature in its evolutionary past, the biophilia hypothesis states that human beings have both an innate affiliation with, and a desire to connect with nature (Kellert & Wilson, 1993).

In the lighting domain, a similar evolutionary argument is sometimes made when advocating a widespread use of wide and full-spectrum fluorescent lighting: Having evolved under the wide spectrum of sunlight, our visual, physiological and biochemical systems should best thrive under similar electric lighting conditions (Wurtman, 1975; Wurtman & Neer, 1970; but see McColl & Veitch, 2001; Veitch & McColl, 2001). Evidence for an ideational preference for natural light may also be found, perhaps not in our evolutionary, but in our cultural heritage: Just consider the Sunlight League, and Sunlight Soap (Carter, 2007).

Some researchers have argued that the natural preference is mainly ideational, not instrumental (e.g., Rozin et al., 2004). When people were asked to choose between a natural drug extracted from plants, and one that had been synthetically produced in a laboratory, a significant proportion of individuals chose the natural option even when it was explicitly stipulated that both drugs were chemically identical (also DiBonaventura & Chapman, 2008). Recently, however, Li and Chapman (2012) have demonstrated that people may not find it credible that the natural and the synthetic substance are indeed chemically the same. As a result, one cannot implicitly assume that the natural and the synthetic option are regarded equal in their instrumental benefits as well (e.g., equally effective and risk-free). Indeed, their participants' preference for natural over synthetic vitamin C correlated positively with their suspicion about the stated chemical similarity, and with the extent to which they believed in unseen differences between the two choice options. These

findings indicate that explicit statements of chemical similarity between the natural and the synthetic substance are not sufficient to rule out a possible instrumental explanation of the natural preference.

Li and Chapman (2012) further argued that ideational and instrumental motives behind the natural preference may be more closely related than previously assumed. On the one hand, a moral superiority of natural products may have led people to develop positive beliefs regarding the instrumental benefits of natural over synthetic products. On the other hand, cultural notions of natural products as healthier, more effective, safer, tastier, and less damaging to the environment than synthetic ones may have installed in people the heuristic that "natural is better" (Li & Chapman, 2012). This heuristic may then act as a shortcut in our reasoning and decision-making processes.

One interesting, and hitherto unexplored possibility for testing more directly the role of ideational motives behind the natural preference is offered by recent advances in measuring people's connectedness to nature (Brügger, Kaiser, & Roczen, 2011; Schultz, Shriver, Tabanico, & Khazian, 2004). Connectedness to nature is defined as an individual's predisposition to affiliate with nature, and is thus conceptually similar to biophilia though without invocation of any evolutionary assumptions. A strong connectedness to nature is associated with biospheric rather than egocentric values (also Schultz, 2001), and with environmental concerns and conservation (also Davis, Green, & Reed, 2009). If there is an ideational basis to the natural preference, then we may expect such preferences to be more strongly observed with people that are more closely interconnected with nature.

1.1. Research goals

In the present paper, we investigate whether the natural preference is also operative in people's appraisal of light. In Study 1, we investigate whether the concept of *natural* has a consistent meaning when people apply it to lighting. Moreover, we test a hypothesis raised by Rozin (2005, 2006) that what people consider to be natural is dependent on the source (e.g., the sun versus electrical lighting), and the extent of transformation of the natural substance (e.g., daylight through a clear versus a blinded window).

Of course, establishing that there exist differences in the perceived naturalness of light emitted by natural and electrical light sources does not provide evidence that the natural preference is operative in the domain of light; people should not only perceive daylight as more natural, they should also prefer it. Thus in studies 2 and 3, we test whether people indeed have a preference for natural daylight over light emitted by a daylight simulator. In addition, we investigate the extent to which people believe in explicit statements of a physical similarity between electrical daylight simulation and light emitted by the sun. If the results support the research by Li and Chapman (2012), then the implication is that explicit statements of physical or chemical similarity are not an effective method for investigating a possible ideational basis behind the naturalness preference.

In a fourth and last study, we correlate the perceived naturalness of light emitted by various natural and electrical light sources with people's attitudes toward the application of these light sources in an office environment. At the same time, we test whether the anticipated positive relation is mediated by the degree to which people hold positive instrumental beliefs with respect to the effects of natural daylight on health, concentration, and the aesthetics of a room. Finally, we investigate whether a person's preference for natural light is related to his or her connectedness to nature. Exploring how connectedness to nature correlates with perceived naturalness, general attitudes, and instrumental beliefs may shed

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