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RESEARCH ARTICLE

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Set that record straight! Cardinal line orientations in music album artwork boost market performance and music consumption

Yannick Joye[1] | Bob M. Fennis[2]

[1]Centre of Economic Expertise, Vilnius University, Vilnius, Lithuania

[2]Department of Marketing, University of Groningen, Groningen, the Netherlands

Correspondence
Bob M. Fennis, Department of Marketing, University of Groningen, Nettelbosje 2, 9747 AE Groningen, the Netherlands.
Email: b.m.fennis@rug.nl

Abstract

In three studies, we examine the effect of music album artwork on album market performance and music consumption. Based on the perceptual preference for visual stimuli with cardinal (orthogonal) over oblique (tilted) line/edge orientations (a phenomenon known as the "oblique effect"), albums with a predominance of cardinal line/edge orientations in their artwork should perform better than albums with more oblique artwork, as indicated by the albums' market performance and consumers' listening behavior. Study 1, using secondary data, shows that the cardinality of album artwork is a positive predictor of the cover's esthetic appeal and of market performance as evinced by its position in the US charts, expert ratings of the album, and the number of weeks the album remained in the US charts. Studies 2 and 3 use experiments to show that consumers listen longer to music when album artwork is relatively more cardinal than oblique. These studies also explore whether the effect is mediated by higher esthetic appreciation of cardinal (vs. oblique) album artwork in turn affecting song liking. Overall, these findings underscore the importance of visual preferences in packaging design for music consumption.

KEYWORDS

consumer judgment and behavior, market performance, music album artwork, music consumption, packaging design

In a highly competitive market, the market performance of popular music crucially depends on the band's or artist's ability to stand out and attract potential consumers (Hracs et al., 2013). It goes without saying that—first and foremost—artists try to seduce their (prospective) audience into music consumption by composing and releasing music that titillates, pleases, or even challenges the senses (Askin & Mauskapf, 2017; Chmiel & Schubert, 2018; Nunes & Ordanini, 2014). Oftentimes, however, the market performance of popular music is not driven by musical merits alone. In addition to capturing the heart musically, artists and bands often also engage in, and create *visual* expressions and displays that are geared at generating and maintaining further consumer attention and interest. Such visual expressions can be manifold and can range from—say—peculiarities about popular artists' physical looks (e.g., beards and ZZ Top) and dress (e.g., Madonna's (in)famous cone bra), to merchandise, such as t-shirts, mugs, or even action dolls (Kiss), iconic performances (Jimi Hendrix setting his guitar on fire), visual presence on music streaming services and gripping video clips. By capturing the eye with such displays, popular artists also seem to aspire to become more successful at reaching and pleasing the ears.

In the present research, we focus on a particular music-related visual display, which has hitherto remained surprisingly under-researched, while highly pervasive in the realm of popular music culture—music album artwork. Indeed, would the Velvet Underground's debut album (*The Velvet Underground and Nico*) have reached its historic status without Andy Warhol's famous banana cover? And which music aficionado would not associate the Beatles with their iconic *Abbey Road* album cover? Despite the historic and esthetic value of these—and other—iconic popular music album covers, currently no systematic research has assessed the impact of such packaging art in the market performance of (popular) music, nor on how it might directly affect music consumption. Indeed, to the authors' knowledge, only two such studies exist to date, one of which did not focus on cover artwork as such. That is, Christenson (1992) studied the impact of so-called parental advisory warning labels on album covers on listening behavior and found consumers listening less to songs from albums containing such labels. The second study that did focus on artwork examined the impact of album cover typeface (rectangular vs. rounded) on consumer expectations about the music (Venkatesan et al., 2022). Results showed that consumers expected music to sound more angular and masculine when the typeface was rectangular rather than round. In the present work, we aim to extend on this seeming void in the literature, by showing that (visual) characteristics of album cover art can affect music consumption (listening behavior) and actual market performance of popular music. We specifically intend to show that album cover artwork that exploits basic and seemingly trivial visual biases can positively affect the listening experience, and hence music consumption.

Music album cover artwork can be considered a form of *everyday consumer esthetics* (Patrick, 2016), because the esthetic responses it can cause may permeate and shape people's everyday lives, also in their capacity as consumers. Most probably, music album artwork can influence consumers' music perceptions—at least partly—through what Hagtvedt and Patrick (2008) have coined an *art infusion effect*. This phenomenon refers to the notion that pairing artwork with consumer products enriches the connotations consumers may cultivate about those products, subsequently coloring product-related responses and evaluations. Thus, much like depicting art on the packaging of mundane consumer products (e.g., a soap dispenser) can enhance one's perception of the product's luxuriousness (Hagtvedt & Patrick, 2008), one might suspect that album cover artwork can infuse music with—say—an air of sophistication, eventually promoting consumers' music quality perceptions, thereby even boosting music consumption and airplay.

What is notable about studies into the art infusion effect (Hoegg et al., 2010; Peracchio & Meyers-Levy, 2005; Veryzer & Hutchinson, 1998) is that the majority of them show that the esthetic stimulus paired with the product represents/symbolizes something *meaningful* to consumers. The sexually charged symbolism of Warhol's *peel slowly and see* banana cover (revealing a flesh-colored banana) might for example infuse the Velvet Underground's music with connotations of avant-gardism, but also of raunchiness and deviance. Likewise, in Venkatesan et al.'s (2022) study discussed above, the rectangular versus rounded album cover typeface induced meaningful expectations about the music (angular and masculine). In cases like this, it is clear that the esthetic stimulus—Warhol's banana artwork or rectangular versus rounded typeface—functions as a meaningful source of inference about the associated product, its performance or attributes, and/or its desirability (Homburg et al., 2015). What is less documented, however, is whether the presence of very *basic* esthetic elements in packaging can similarly and substantively affect consumer judgment and choice. With the current work, we aim to shed light on this issue, by showing that the presence of esthetically laden, but basic and semantically *meaningless* shape elements in album cover artwork can similarly positively affect music consumption.

1 | ARTWORK CARDINALITY AND THE OBLIQUE EFFECT

To make our reasoning more explicit, consider the *Abbey Road* cover again, picturing the Beatles on a crossroads at Abbey Road, London. What is striking about this cover is that it is composed around the two cardinal (i.e., vertical and horizontal) orientations: the crossroads, sidewalks, and road striping all depict a spatial representation of (mainly) vertical and horizontal lines. Might something as basic as this predominance of cardinal (vs. oblique, or tilted) line orientations in this (and other) album cover artwork favorably affect album performance, both artistically and commercially? There are reasons to suspect it might.

In psychology and perception science, the positive effect of cardinal versus oblique (stimulus) orientation on task performance is an established and robust finding (Appelle, 1972; Heeley et al., 1997; Lupón-Bas, 2014). For both humans and nonhuman animals (ranging from primates to goldfish, see Balikou et al., 2015; Mackintosh & Sutherland, 1963; Nissen & McCulloch, 1937), execution of visual tasks proves to be superior for stimuli that are cardinally rather than obliquely oriented (Appelle, 1972)—a basic perceptual phenomenon commonly referred to as the *oblique effect* (Balikou et al., 2015; Maloney & Clifford, 2015). One of the earliest demonstrations of this effect consisted of showing that while individuals are very accurate at detecting whether lines are parallel at horizontal and vertical orientations, they perform worse on this task when lines are obliquely oriented (i.e., at a 45° angle; Appelle, 1972).

Importantly, although research is scarce, the oblique effect may not be limited to basic perceptual tasks, such as stimulus identification and organization judgments, but may possibly extend to visual preferences. For example, the renowned paintings by Dutch *De Stijl* painter Mondrian were gazed at longer and were liked better when displayed in their original, cardinal orientation, rather than in a tilted, oblique one, suggesting that something as seemingly trivial as visual stimulus orientation may affect esthetic appreciation of that stimulus (Plumhoff & Schirillo, 2009). Moreover, an analysis of line orientations in 20th century landscape and portrait paintings, uncovered an overrepresentation of horizontal/vertical as opposed to oblique orientations (Latto et al., 2000; Latto & Russell-Duff, 2002).

Such findings indicate that the preference for cardinal over oblique line orientations may be a so-called esthetic primitive—a (visual) stimulus that is generically and intrinsically pleasing because it resonates with the basic mechanisms of the visual system processing it, similar to the (seemingly) universal preference for symmetrical over asymmetrical forms/patterns (Bertamini et al., 2013). Indeed, as Latto (1995) suggests, the perceptual and esthetic primacy of cardinal over oblique line orientations may be due to the fact that in the human visual cortex, there are more Hubel and Wiesel orientation detectors tuned to horizontal/vertical than to oblique lines/edges (Mikelidou et al., 2015). As such, the oblique effect may constitute an instance of perceptual fluency that operates outside conscious awareness (Meng & Qian, 2005; Shapiro & Nielsen, 2013).

But may this basic visual bias also affect consumer evaluations and actual behavior? And, if so, can it do so even by transcending sensory modalities, from the eye to the ear, such that this visual album cover feature affects auditory consumer perceptions—the experience of the music on the album? The present research aims to examine these questions.

2 | RESEARCH ON PRODUCT PACKAGING DESIGN FEATURES AND THE OBLIQUE EFFECT

Notably, in the psychology and marketing literature, ample research has focused on product packaging design features (e.g., Azzi et al., 2012) and on how package design features may affect consumer responses and experiences (e.g., Homburg et al., 2015; Hwang & Kim, 2022; Krider et al., 2001; Krishna, 2013; Nemath et al., 2022; Orth & Malkewitz, 2008; Raghubir & Greenleaf, 2006; Schlosser et al., 2018). However, less research has focused on more basic and subtle cross-modal sensory effects of packaging attributes that are associated with the product under consideration but are semantically unrelated to it (see Krishna, 2013). For example, Wang et al. (2020) examined the cross-modal effects of sound frequency and color saturation on product perceptions and found that under high color saturation conditions, the use of lower frequency sounds increased the perceived size of the product. However, in this study, the sound was extrinsic to the product (i.e., played in the background) and hence not an intrinsic product attribute (see also Hwang et al., 2020). Within this limited literature, even less research has focused on such cross-modal design features that are an intrinsic part of the product (but see Chylinsky et al., 2015; Van Rompay & Fennis, 2019; Velasco & Spence, 2019 for notable exceptions). Given the potentially substantial "yield" in terms of marketing return-on-investment, this might be qualified as a notable research gap something the present work addresses with regard to the oblique effect. Indeed, from a managerial perspective, if merely changing the line orientations on a package might suffice to positively affect consumer responses, that would likely be considered an efficient investment for a possibly substantial return.

Using music album cover artwork as a case in point, the present research is thus the first to examine the role of the oblique effect as a specific visual packaging design feature in consumer judgment and behavior. More specifically, we aim to extend previous work by showing that this effect exists and that it may affect evaluations of the album's music that is semantically unrelated to, yet associated with the visual stimulus. We regard music album artwork as a most ideal testing ground to examine such cross-modal effects because it constitutes one of the few consumer stimuli where eyes and ears seem to meet. Importantly, we propose that when album artwork exploits the (assumed) basic preference for cardinal line orientations (Latto, 1995), then that artwork might be evaluated more positively than obliquely oriented artwork, thus yielding the following hypothesis (see Figure 1 for the full conceptual model and all hypotheses):

> **H1** Album artwork line orientation affects consumer evaluative responses, such that artwork with relatively more cardinal line orientations will be appreciated more than artwork with relatively more oblique orientations.

More crucially, when incidentally paired to actual music ostensibly drawn from that album, we expect more cardinal album artwork line orientation to promote increased music consumption, as well as

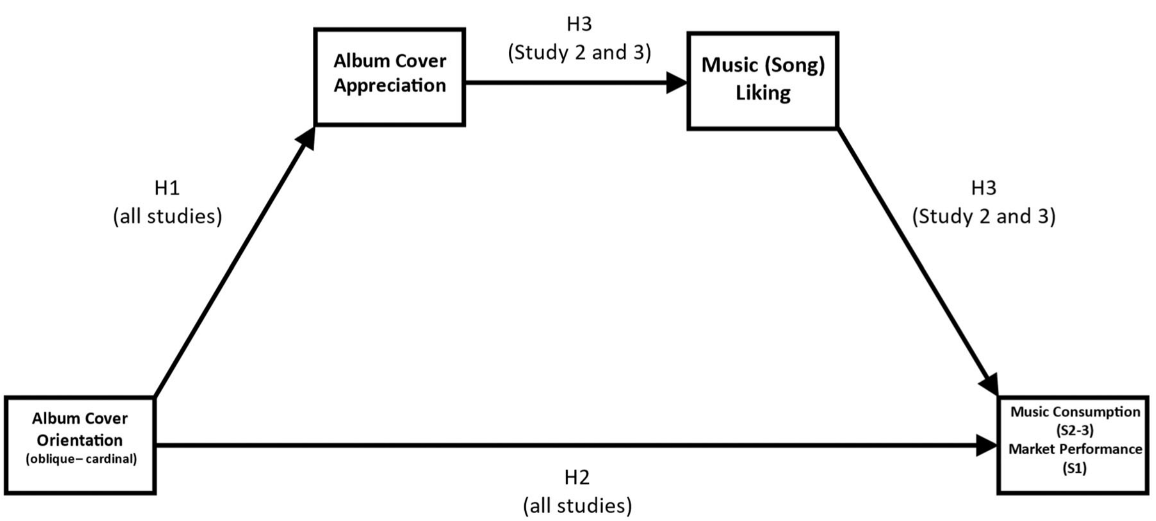

FIGURE 1 Conceptual model and hypotheses.

actual market performance of the album even when controlling for intrinsic music liking and other third variables. Hence, we propose:

H2 Album artwork line orientation affects music consumption and market performance, such that artwork with relatively more cardinal line orientations will promote music consumption and market performance, even when controlling for intrinsic music (genre) liking and other third variables.

3 | AFFECT MISATTRIBUTION AND THE OBLIQUE EFFECT

We further set out to explore whether the proposed (cross-modal) oblique effect on album market performance and consumer music evaluations may be driven by an affect misattribution process (Cameron et al., 2012; Payne et al., 2010). Affect misattribution is considered to be a specific type of priming effect (Gawronski & Ye, 2014) that hinges on the pervasive human tendency to make mistaken attributions about their psychological states and experiences, particularly affective, evaluative ones (Jones et al., 2009). A classic example is the research by Schwarz and Clore (1983) who showed that people tend to mistakenly attribute their affective states caused by the weather to their general life satisfaction.

Thus, stated more formally, affect misattribution occurs when consumers (implicitly) misattribute an affective, evaluative response elicited by a prime stimulus (in the present case a visual stimulus—album artwork line orientation) to a semantically unrelated target (in our case an auditory stimulus—music ostensibly drawn from the album), thus misattributing the esthetic appreciation derived from observing the cardinally oriented artwork to the music. More in particular, the affect misattribution process consists of three components. First, the prime should elicit an affective (evaluative) response. Second, the target may elicit an affective (evaluative) response, and third, the apparent source of the affective response to the target is confused with the real source of the affective response, which is the prime (Payne et al., 2010).

Translated to the present case we would expect album artwork line orientation (the prime) to induce differential esthetic appreciation for the album cover artwork (the affective response) as a function of its relative cardinality (see H1). Second, we would expect the music ostensibly taken from the album (the target) to evoke a certain extent of liking (the affective response). Third, confusion is evinced when album artwork line orientation (the real source of the affective response) influences music liking, even when the perceived source of this affective response (the music) is kept constant (see H2). Notably, the misattribution process is deemed implicit because it operates outside of conscious awareness, such that while both the prime and the target stimulus are consciously perceived, individuals are typically unaware of the influence of the prime on the evaluation of the target stimulus (cf. Bargh, 2022; Payne et al., 2010). Such misattribution does not require repeated pairings between stimuli but may occur upon a single pairing between prime and target (cf. Payne & Lundberg, 2014).

This full affect misattribution-driven spillover effect would require us to demonstrate empirical support for the following hypothesis:

H3 the proposed positive effect of relative cardinality of music album artwork on actual music consumption is mediated by positive affective evaluations of the album cover artwork in turn positively predicting affective evaluations of the music on the album, eventually translating into increased music consumption.

4 | CONTRIBUTIONS

With the current research, we contribute to the consumer behavior literature in four ways. First, and foremost, we contribute to research on the impact of basic visual package design features on consumer responses to brands and products (Homburg et al., 2015; Krider et al., 2001; Krishna, 2013; Mead & Richerson, 2018; Raghubir & Greenleaf, 2006; Schlosser et al., 2016). We extend this line of research by introducing one such specific feature, the oblique effect in music album cover artwork, and examine its impact on consumer judgment and choice, both at the individual and at the market level.

Second, our approach extends research on the effects of low-level perceptual features on consumer behavior (Hagtvedt & Adam Brasel, 2017), by blending perception science (i.e., the oblique effect) with consumer-psychological and marketing research. We do so by using secondary data analysis, experimental methods (Studies 2 and 3), but also by means of an innovative methodology, where we determine the cardinality of music covers with advanced algorithms from vision research, and where we subsequently link these algorithmic outcomes to secondary data on the associated albums' market performance (Study 1).

Third, our research advances our understanding of the principles driving music appreciation (Nunes et al., 2015; Wapnick, 1976). While acoustic and/or lyrical elements in music are known to affect the market performance of associated music albums (Nunes et al., 2015), the present research looks beyond musical features. Specifically, extending research on the effect of packaging/presentation of consumer goods on consumer experience and sales (Raghubir & Greenleaf, 2006), we test whether album cover art can affect both consumer behavior and market performance (Nunes et al., 2015; Wapnick, 1976). For this, we focus specifically on the role of subtle and/or seemingly trivial aspects of album cover art, that is, its cardinality.

Finally, the present work aims to demonstrate that the oblique effect may not be limited to the eliciting stimulus per se (the album cover) but may also extend beyond the source stimulus to affect evaluations of an unrelated stimulus (music). In so doing, we extend work on cross-modal effects in marketing and consumer behavior along two lines. First, we supplement work on *semantic* transfer effects, such as research on embodied spillovers (Krishna & Schwarz, 2014), with research examining *non*semantic transfer effects. Furthermore, we supplement spillover effects due to a *synesthetic* correspondence (i.e., based on a congruence between basic stimulus features in different sensory modalities; Hagtvedt & Adam Brasel, 2017) with *non*synesthetic spillover effects (i.e., where there is no apparent congruence between basic features in the two—visual and auditory—modalities).

5 | THE PRESENT RESEARCH

In three studies, we blend perception science (i.e., the oblique effect) with psychology and marketing research dealing with the effects of low-level perceptual features on consumer behavior. We test the proposition that the relative cardinality of album cover artwork can positively affect consumer evaluations—not merely of the visual artwork itself but also of the album's music. For Study 1—a secondary data study—we collected a large sample of covers of popular music albums and established the relative cardinality of each of those covers with an (automated) algorithm developed for visual feature analysis (see, e.g., Redies et al., 2017). Using this information, we test whether the more album cover artwork would contain cardinal line segments, the better that album would score in terms of esthetic cover appeal and market performance (after accounting for a host of third variables), as indicated by higher peak positions in the US album charts, more positive expert ratings of the album, and a longer stay (in terms of number of weeks) in the US album charts. In Studies 2 and 3, we more tightly assess the assumed association between artwork cardinality and music evaluation using an experimental paradigm and examine whether (incidental) exposure to cardinal versus oblique album artwork would affect music consumption of the songs on that album—as indexed by actual behavior—listening time. We further examine whether this effect from a visual stimulus to auditory evaluations could be explained by an affect misattribution process, whereby a cover's cardinality affects visual esthetic appreciation of the cover, which affects song liking, in turn prompting consumers to listen longer to the music.

6 | STUDY 1

Our first study blends (automated) visual feature analysis of music album cover artwork with secondary data on those music album covers' esthetic appreciation and market performance and provides a first test of the notion that the oblique effect may be consequential in the realm of consumer judgment and choice. For the study, we collected a large sample of album cover images from a wide range of popular artists/bands and determined the percentage of cardinal versus oblique line/edge orientations for each cover using advanced algorithms from vision research (Haberman et al., 2015; Marĉelja, 1980). We expected that the relative prevalence of cardinal (vs. oblique) line orientations in album covers would positively predict (professional) esthetic appreciation and market performance in terms of the album's peak position in the US album charts, expert ratings of the album, and the duration (in number of weeks) that the album was listed in the charts (above and beyond a host of third variables).

6.1 | Method

6.1.1 | Album cover images

For this study, we collected a sample of 326 high-resolution images of music album covers, retrieved from online lists dedicated to showcasing either appealing or non-appealing album cover artwork. The appealing album covers ($n = 175$) were sampled from online album cover lists released by lifestyle magazine *ShortList* (Shortlist.com), music website *MusicRadar* (Musicradar.com), youth culture magazine *Complex* (Complex.com), and from the annual Grammy Awards website for Best Recording Package (Grammy.com). The nonappealing covers ($n = 151$) were taken from album cover lists published by the online music magazine *Pitchfork Media* (Pitchfork.com), online lifestyle magazine *Gunaxin* (Gunaxin.com), pop culture website *SoBadSoGood* (Sobadsogood.com), and again music website *MusicRadar*.

The sampling of album covers was performed by a research assistant, blind to experimental hypotheses, and was exhaustive in that we included all albums that were listed on these appealing/nonappealing covers lists. After screening out two low-quality cover images, our final sample consisted of 324 high-resolution images of these album covers, spanning seven decades of popular music (from 1956 until 2013), and representing a broad range of popular music genres, as well as different kinds of album artwork (see the Supporting Information for a listing of the albums).

6.1.2 | Predictor: Cardinality index

We used image processing technology to assess the relative cardinality of each album cover image. First, we resized the images to a size of 500 × 500 pixels and converted the color images of the album covers to grayscale images by using the ITU-R 601-2 luma transform, where color channels are weighted according to their luminance, as perceived by human observers. We converted the color images to grayscale images to reduce the computational load involved in using image processing (cf. Haberman et al., 2015; Marĉelja, 1980; Redies et al., 2017), since grayscale images involve only one channel (intensity), while color images typically have three (red, green, and blue). Note that since color is unrelated to cardinality, using grayscales does not affect the assessment of relative cardinality.

For the resulting grayscale album cover images, we determined the relative cardinality of each album by applying so-called Gabor filters (Haberman et al., 2015; Marĉelja, 1980; Redies et al., 2017). Gabor filters are orientation-sensitive filters that are used in image processing to detect line/edge elements of particular orientations in a target image. If, for example, a target image mainly consists of cardinal line/edge elements, a Gabor filter will give a pass, only when the filter's orientation matches the (cardinal) orientation of the lines/edges. Hence, employing Gabor filters allowed us to determine, for each line/edge element on an album cover image, whether it was either cardinally or obliquely oriented.

In our album cover set, line/edge orientations were detected by applying a filter bank of 24 equally sized Gabor filters that represent one full 360° rotation when combined, with each filter having a diameter of 9 pixels. In our filter bank, four filters captured cardinal line/edge elements, whereas the 20 remaining filters detected oblique orientations (see Figure 2 for the complete filter bank). For each element on the album cover image, the orientation with the highest filter response was taken as the orientation of that line/edge element. This procedure allowed us to assess the strength of each of the 24 orientations, that is, the number of line/edge elements in a given cover image that had that particular orientation.

Once we had assessed the strength of all 24 orientations for all line/edge elements in each album cover image, we calculated the percentage of cardinal line/edge orientations as a function of all line/edge orientations (both cardinal and noncardinal). We did this by dividing the sum of the strength values of the (four) cardinal orientations by the sum of the strengths of the (20) oblique and (four) cardinal orientations in a given cover image and multiplying that number by 100. The resulting cardinality index could range from 0% to 100%, with 100% indicating exclusively cardinal orientations, and 0% only oblique orientations in the album cover image. The cardinality index was the key predictor in our target analyses. Four albums had an extreme outlying value (more than three standard deviations [SDs] removed from the mean) on this cardinality index and were therefore not included in the target analyses.

Note that if all 24 orientations in the covers would be represented equally strong—as would be expected if the orientations of line/edge elements were randomly distributed—then the average value of the cardinality index in our sample of album images would be 16.67% (i.e., four divided by 24). In line with past research (Girshick et al., 2011), the average cardinality index proved to be higher than what can be expected by chance (i.e., 28.40% instead of 16.67%, SD = 9.90%; $t(319) = 21.19$, $p < 0.001$), indicating a relative over-representation of cardinal versus oblique line/edge elements in our album cover set.

Criterion variables: esthetic appreciation, US album chart peak position, expert ratings, number of weeks in the US album charts.

We tested whether the cardinality index could predict four real-world dependent variables: (professional) esthetic appreciation, and three indicators of market performance, namely, US album chart peak position in the *Billboard Top 200* album charts, expert ratings by *Rolling Stone* magazine, and the number of weeks the album was present in the *Billboard Top 200* album chart. More in particular, the fact that each album came from online lists that evaluated it as either appealing or nonappealing (see Section 6.1.1) allowed us to replicate and extend previous research suggesting that a predominance of cardinal (vs. oblique) line segments in visual art is associated with esthetic appreciation (cf. H1; Miller, 2007; Plumhoff & Schirillo, 2009).

We also examined whether cardinality could predict an album's peak position in the US charts. The US music market is the largest and most influential in the world and therefore provides a good testing ground for our hypothesis (International Federation of the Phonographic Industry [IFPI], 2015). For 192 album covers of our total

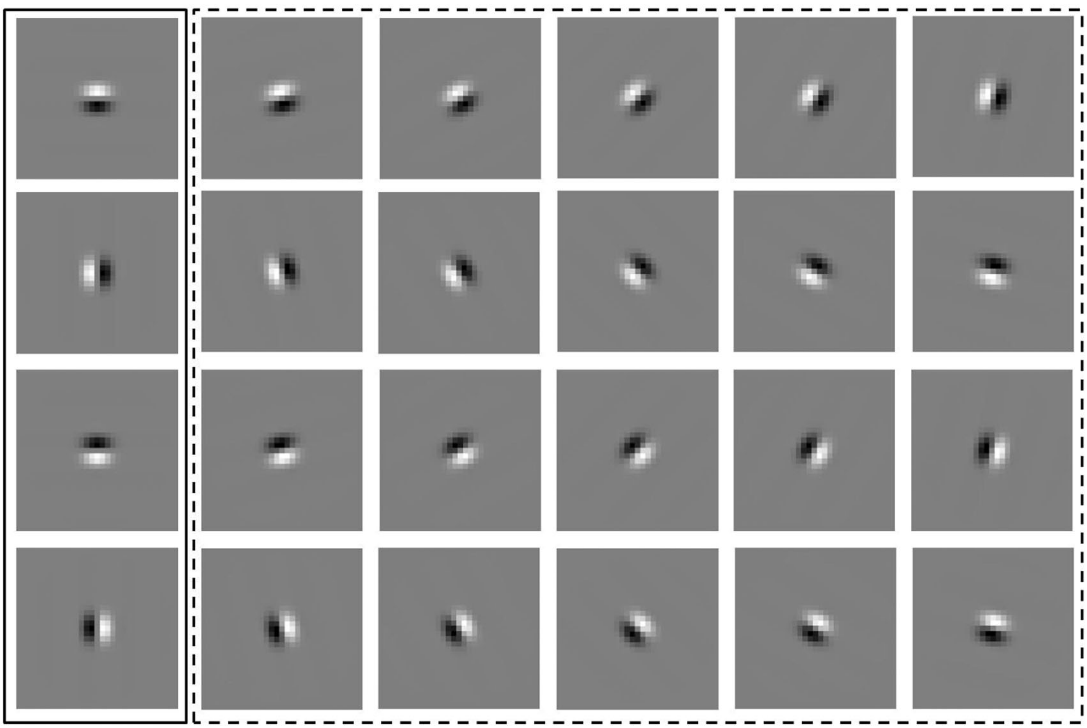

FIGURE 2 The bank of 24 Gabor filters used in Study 1, with each filter capturing the orientation of a particular line/edge element. The filters enclosed by the solid line ($n = 4$) detect cardinal orientations, whereas the filters enclosed by the dashed line ($n = 20$) detect the oblique orientations in a given target image.

cover set, we were able to gather data on the highest position of the corresponding album in the top 200 album charts in the United States, as listed by Billboard.com ($M = 36.08$, $SD = 47.81$). As additional proxies of market performance, we gathered album expert ratings from the *RollingStone* website (see RollingStone.com) for 145 albums of our total cover set from the *RollingStone* website (rollingstone.com), with evaluations ranging from 1 ("worthless") to 5 ("indispensable"; $M = 3.85$, $SD = 0.84$). Finally, for 184 albums we were able to retrieve data (from www. Kaggle.com) on the duration in weeks the album featured in the US album *Billboard Top 200* charts (ranging from 1 week to 981 weeks; $M = 68.25$, $SD = 135.72$).

6.1.3 | Control measures

We included a number of plausible third variables in our study, to account for the possibility that they might fulfill one of the two following roles: (a) they might be confounded with our key predictor (i.e., relative cardinality) or (b) they might not be correlated with the key predictor, yet explain meaningful variance in our key DV's, thus acting as covariates, requiring us to account for their predictive power (Meyvis & van Osselaer, 2017; Wang et al., 2017).

We considered three potential confounds of the cardinality index. First, we assessed the presence of animal/human forms on the album cover (0 = absent, 1 = present), as the curvature characteristic to animal/human form (Levin et al., 2001) might be associated with a higher prevalence of oblique orientations in the album covers. Second, we assessed the presence of letters on the cover, as these have been shown to contain relatively more cardinally oriented than oblique line/edge elements (0 = no letters, 1 = letters; Morin, 2018). Third, because nonphotographic (figurative and abstract) artwork typically contains a predominance of cardinal versus oblique orientations (Latto et al., 2000; Latto & Russell-Duff, 2002; Miller, 2007; Plumhoff & Schirillo, 2009), we assessed the presence of nonphotographic elements in the cover images (0 = nonphotographic, 1 = photographic elements).

A number of variables may also explain meaningful variance in (professional) esthetic appreciation of the covers and any or more of the three indicators of market performance, thus requiring us to control for their predictive power. First, beyond any oblique effect, an album's market performance might be (partly) driven by a successful album hitsingle. For each included album, we therefore determined the peak position of the hitsingle from that album in the US single *Billboard Top 100*.[1] Second, the artist's or band's past market performance may predict future popularity (Strobl & Tucker, 2000). As a proxy, we used the total number of past top 50 hitsingles of the artist/group in the US charts, up until the release of the album under consideration. Third, we included the album's year of release, because prevalence, preferences, and quality perceptions of music (genres) may be a function of time. Finally, we determined the music genre of each album.[2] Certain genres—especially mainstream pop music—typically attract larger audiences than others (e.g., experimental jazz), and—ceteris paribus—such popular genres are therefore more likely to end up higher in the charts. Using existing (online) databases, we classified each album according to one of the following genres: pop, rock/alternative, folk, blues, electronic, jazz, and hip hop. We created dummy variables for each genre and used pop as the reference variable in the regression analyses.

6.1.4 | Analysis strategy

We used a stepwise approach to analyze the data. First, as a preliminary analysis, we tested whether any of the candidate confounding variables (i.e., presence of animal/human form, presence of letters, type of artwork) were indeed significantly associated with the cardinality index—our key predictor. Variables that were indeed associated, were retained in the target analysis. After this, we performed a series of logistic, OLS, and ordinal logistic hierarchical multiple regression analyses, depending on the nature of the dependent variables—logistic regression for esthetic appreciation, ordinal logistic regression for peak position given the ordinal, rank-ordered nature of the data, and OLS regression for expert ratings and number of weeks in the US charts. In each of these, we first regressed the respective criterion variable (i.e., esthetic appreciation, US chart peak position, expert ratings, number of weeks in the US charts) onto the set of confounding variables (if any) and covariates. In the second step of each regression, we added the cardinality index to the model and tested whether it substantially and significantly predicted esthetic appreciation, US album peak position, expert ratings, and/or number of weeks in the US album charts, above and beyond any of these third variables.

6.2 | Results and discussion

6.2.1 | Preliminary analysis

To assess the presence of variables confounded with the key predictor—the cardinality index—we regressed this index on the presence of letters, type of artwork, and presence of human/animal form. Replicating earlier research (Morin, 2018), the results indicate that the presence of letters approaches statistical significance and positively predicts the cardinality index($B = 3.32$, standard error

[1]For the albums without any hitsingles, the hitsingle's peak position was set at 200—a low value well outside the range covered by the charts.

[2]We first classified each album by the genre with which they were listed on the website www.allmusic.com. This classification turned out to be so fine-grained (with 21 music genres) that for multiple genres there were no or only a few observations. To reduce our genre list to a manageable size and to end up with a substantial number of observations per genre, we therefore collapsed closely related (sub)genres into more overarching ones. For example, we aggregated subgenres such as hard rock, heavy metal, Latin rock, and psychedelic rock under the general genre rock. We did this using established genre lists from Wikipedia, which can be retrieved at https://en.wikipedia.org/wiki/List_of_popular_music_genres.

[SE] = 1.77, $t[318] = 1.88$, $p = 0.061$) and this variable is therefore included in our main analyses. The presence of animal/human form ($B = -2.26$, SE = 1.56, $t[318] = -1.45$, $p = 0.149$)and type of artwork ($B = 0.83$, SE = 1.13, $t[318] = 0.73$, $p = 0.465$)are not significantly related to the cardinality index and thus will not be discussed further.

6.3 | Target analyses

As indicated, for our main analyses, we performed hierarchical multiple regression analyses, using logistic regression for the (dichotomous) esthetic appreciation ratings, ordinal logistic regression for Billboard Top 200 US album peak position, and OLS regression for the expert (*Rolling Stone*) ratings and number of weeks in the US album charts (log-transformed for analysis to account for skew).

These analyses take into account the results of the preliminary analyses. In line with recommendations outlined by O'Brien (2007), we determined variance inflation factors to assess the extent to which multicollinearity could hamper the interpretation of the analyses' results. In both models, the variance inflation factors are lower than 2, indicating that multicollinearity is not an issue in this study (see O'Brien, 2007 for an extended discussion).

Moreover, a post hoc sensitivity power analysis using G*Power (Faul et al., 2007)—using a multiple regression fixed model assessing R^2 increase with 12 predictors, and an alpha level of 0.05 (two-tailed) shows that the samples used in this study (i.e., the full sample of 324 covers for assessing esthetic appreciation, the subset of 192 for which US chart peak position data could be retrieved, the subset of 145 for which we could retrieve *Rolling Stone* expert ratings, and the subset of 184 for which data on number of weeks in the US charts could be retrieved) yield 80% power to detect effects as small as $f^2 = 0.02$, $f^2 = 0.04$, $f^2 = 0.05$, and $f^2 = 0.04$, respectively, which is sensitive enough to pick up effects that are substantially smaller than what previous studies on the oblique effect have reported (Latto et al., 2000; Miller, 2007; Plumhoff & Schirillo, 2009).

In Step 1 of the regressions, esthetic appreciation of the cover, album peak position, expert ratings, or number of weeks in the US charts was each regressed on the presence of letters (a possible confound) and on the variables that may account for meaningful variance in esthetic appreciation and/or album peak position—hitsingle peak position, number of past top 50 hitsingles, year of release, and music genre of the album under consideration (see Tables 1–4 for results). In Step 2, the cardinality index was added to the set of initial predictors in all regressions to assess whether it was able to predict each of the outcomes over and above the set of predictors entered at Step 1.

6.3.1 | Esthetic appreciation

For esthetic appreciation, the results of the logistic regression show that in Step 1, the presence of letters, hitsingle peak position, and the dummy codes for jazz and hip hop are significant predictors (see Table 1). Specifically, when album covers feature no letters (vs. letters), and the higher the hitsingle peak position, the higher the odds that the cover is classified as esthetically appealing. Compared to pop albums, jazz, and hip hop album covers have respectively higher and lower chances of being esthetically appreciated. Including the cardinality index at Step 2 predicts esthetic appreciation over and beyond the set of variables entered at Step 1. Thus, in line with H1, the more the album artwork contains cardinally oriented line/edge elements, the higher the odds that the album cover is featured on online lists of esthetically appealing (vs. unappealing) album cover artwork.

6.3.2 | Album peak position

For album peak position, the results of Step 1 of the hierarchical ordinal logistic multiple regression show that the variables number of top 50 hitsingles, hitsingle peak position, year of release, and all genres except electronic and soul are significant predictors in Step 1 (see Table 2). Thus, albums end up higher in the charts in case of more top 50 hitsingles (note again that a higher position in the charts is evinced by a lower score, with 1 being the highest and 200 the lowest score in the US charts), lower chart positions of the main hitsingle on the album, when the album is more recent, and when it features rock/alternative (vs. pop) music, rather than blues, folk or jazz. Of more interest is that the results of Step 2 reveal that the cardinality index also contributes significantly to the album peak position (see Table 2), over and above the other predictors (as per H2). More specifically, the higher the percentage of cardinal line/edge orientations in an album cover, the higher (i.e., better) the album's US chart position. The addition of this single predictor significantly increases R^2 compared to Step 1.

6.3.3 | Expert ratings

For expert ratings, Step 1 results of the hierarchical multiple regression show that hitsingle peak position, the use of letters, and the year of release significantly predict *Rolling Stone* ratings with higher hitsingle peak position, the absence of letters, and more recent years of release predicting higher ratings (see Table 3). In line with the results above and H2, adding the cardinality index at Step 2 reveals that more cardinally oriented artwork predicts more positive expert reviews, again over and above the set of predictors entered at Step 1.

6.3.4 | Weeks in the US album charts

For number of weeks in the *US Billboard Top 200 album charts*, Step 1 of the hierarchical multiple regression shows that higher hitsingle peak position, and older years of release positively predict number of weeks in the charts, while the genre electronic (compared to pop)

TABLE 1 Results of the hierarchical multiple logistic regression analysis for esthetic appreciation.

Model	Predictor	Estimate	SE	Z	p	OR	R^2	$\Delta\chi^2$	$\Delta\chi^2$
1							0.28	74.93***	—
	Intercept	−25.62	18.60	−1.38	0.168	0.00			
	Top 50 hitsingles	0.02	0.02	1.13	0.258	1.02			
	Hitsingle peak position	−0.01	0.00	−4.34	<0.001	0.99			
	Letters	−2.08	0.52	−3.99	<0.001	0.13			
	Year of release	0.01	0.01	1.57	0.117	1.01			
	Soul	−0.52	0.58	−0.90	0.368	0.59			
	Blues	−0.96	0.93	−1.04	0.299	0.38			
	Folk	0.20	0.56	0.35	0.724	1.22			
	Jazz	1.58	0.77	2.05	0.041	4.83			
	Electronic	−0.13	0.50	−0.27	0.787	0.87			
	Hip hop	−1.61	0.60	−2.67	0.008	0.20			
	Alternative/rock	−0.10	0.36	−0.29	0.772	0.90			
2							0.31	83.36***	8.43**
	Intercept	−22.66	19.00	−1.19	0.233	0.00			
	Top 50 hitsingles	0.03	0.02	1.21	0.226	1.03			
	Hitsingle peak position	−0.01	0.00	−4.26	<0.001	0.99			
	Letters	−2.24	0.53	−4.22	<0.001	0.11			
	Year of release	0.01	0.01	1.33	0.183	1.01			
	Soul	−0.67	0.59	−1.13	0.257	0.51			
	Blues	−1.03	0.96	−1.08	0.281	0.36			
	Folk	0.02	0.57	0.03	0.974	1.02			
	Jazz	1.43	0.78	1.83	0.068	4.18			
	Electronic	−0.21	0.50	−0.42	0.675	0.81			
	Hip hop	−1.80	0.62	−2.92	0.003	0.16			
	Alternative/rock	−0.13	0.37	−0.35	0.727	0.88			
	Cardinality	0.04	0.01	2.82	0.005	1.04			

Abbreviations: OR, odds ratio; R^2, Nagelkerke R^2; SE, standard error.
*$p < 0.050$; **$p < 0.005$; ***$p < 0.001$.

associates negatively (see Table 4). Aligning with the results above, in Step 2, the album cover cardinality index is added to the set of variables and positively predicts the number of weeks the album featured in the US *Billboard Album Top 200* in line with H2.[3]

Our results replicate and extend past research on the oblique effect that has shown that a predominance of cardinal line/edge elements in visual art is associated with esthetic appreciation, as per H1 (Miller, 2007; Plumhoff & Schirillo, 2009). In addition, the present findings support H2, showing that the oblique effect may actually predict market performance (in the United States) of the (cultural)

[3]See Supporting Information for a reanalysis using a Cox proportional hazards survival regression (cf. Vadakkepatt et al., 2021) as well as a Poisson regression, given the nature of the data. As to the latter we do note that we included this analysis mainly for illustrative purposes and results need to be treated cautiously since the distribution of the data failed to follow a Poisson distribution(KS [Kolmorogov Smirnov] $Z[184] = 9.09$, $p < 0.001$)effectively invalidating this as a suitable analysis approach. Moreover, the standard deviation ($SD = 135.72$) was substantially larger than the mean ($M = 68.25$). This *overdispersion* is problematic since it generally leads to deflated standard errors and inflated *z* values, yielding a higher likelihood of Type I errors (Elhai et al., 2008). Although in such cases negative binomial regression is generally advised (e.g., Xie, 2017), this too is not a viable option in the present case, since the negative binomial approach assumes the possibility of the presence of zeros in the data, which there were not (note again that the available data by definition exclude zeros and range from 1 to 981 weeks). It is for these reasons that we report the OLS regression as the target analysis for this data.

TABLE 2 Results of the hierarchical ordinal logistic regression analysis for Billboard Top 200 US album peak position.

Model	Predictor	Estimate	SE	Z	p	OR	R^2	χ^2
1							0.09	123.82***
	Top 50 hitsingles	−0.05	0.02	−3.18	0.001	0.95		
	Hitsingle peak position	0.01	0.00	7.48	<0.001	1.01		
	Letters	0.82	0.44	1.88	0.060	2.27		
	Year of release	−0.03	0.00	−114.68	<0.001	0.97		
	Soul	−0.01	0.45	−0.03	0.978	0.99		
	Blues	0.46	0.04	11.96	<0.001	1.59		
	Folk	0.50	0.15	3.39	<0.001	1.65		
	Jazz	1.14	0.11	10.05	<0.001	3.12		
	Electronic	0.10	0.46	0.23	0.822	1.11		
	Hip hop	−1.17	0.30	−3.96	<0.001	0.31		
	Alternative/rock	−1.25	0.26	−4.77	<0.001	0.29		
2							0.10	133.47***
	Top 50 hitsingles	−0.06	0.02	−3.49	<0.001	0.94		
	Hitsingle peak position	0.01	0.00	7.48	<0.001	1.01		
	Letters	0.97	0.43	2.24	0.025	2.64		
	Year of release	−0.03	0.00	−85.60	<0.001	0.97		
	Soul	0.01	0.46	0.01	0.990	1.01		
	Blues	0.72	0.04	17.14	<0.001	2.05		
	Folk	0.81	0.14	5.90	<0.001	2.24		
	Jazz	1.37	0.13	10.91	<0.001*	3.92		
	Electronic	0.09	0.46	0.20	0.845	1.09		
	Hip hop	−1.17	0.30	−3.92	<0.001	0.31		
	Alternative/rock	−1.29	0.26	−4.90	<0.001	0.27		
	Cardinality	−0.04	0.01	−3.04	0.002	0.96		

Abbreviations: OR, odds ratio; SE, standard error.
*$p < 0.050$; **$p < 0.005$; ***$p < 0.001$.

products associated with it. We find that the cardinality index significantly predicts album peak position, expert ratings, and duration in the US album charts, such that a relative prevalence of cardinal line/edge orientations in album artwork contributes positively to each of these indices of market performance, over and above a substantial range of third variables. We obtain these results using an innovative approach combining (automated) visual feature analysis of album artwork with secondary data on market performance.

While our account posits that (incidental) exposure to cardinal artwork can positively influence music consumption, this study is evidently also limited because its correlational nature does not allow us to draw any unequivocal conclusions about the causal direction of the oblique effect, nor do they exhaustively exclude (other) third variables underlying the observed association. Therefore, using experimental designs, the next two studies enable us to unequivocally establish the causal direction of the associations found in this study—i.e., that cardinality positively affects consumer evaluations rather than vice versa—as well as to look at the presumed process underlying the effect.

7 | STUDY 2

The previous study suggests that the relative cardinality of album cover artwork is associated with esthetic appreciation of the cover and actual market performance of the associated album's music. This study extends Study 1, by experimentally testing the *causal* relationship between cardinal (vs. oblique) album artwork and music consumption. For this, we exposed consumers to either cardinally or obliquely oriented music artwork and gauged how this influenced their music consumption, as indexed by listening behavior. We expect

TABLE 3 Results of the hierarchical multiple linear regression analysis for expert (Rolling Stone) ratings.

Model	Predictor	Estimate	SE	t	p	F	R^2	ΔR^2
1						7.22***	0.21	–
	Intercept	−25.73	14.92	−1.72	0.086			
	Top 50 hitsingles	0.02	0.01	1.66	0.098			
	Hitsingle peak position	−0.01	0.00	−4.69	<0.001			
	Letters	−0.89	0.33	−2.67	0.008			
	Year of release	0.01	0.01	1.97	0.049			
	Soul	−0.40	0.46	−0.87	0.382			
	Blues	−1.32	0.71	−1.87	0.062			
	Folk	−0.69	0.48	−1.45	0.147			
	Jazz	−0.47	0.57	−0.83	0.409			
	Electronic	−0.11	0.40	−0.27	0.791			
	Hip hop	−0.37	0.45	−0.82	0.411			
	Alternative/rock	0.25	0.29	0.85	0.396			
2						7.19***	0.22	0.01*
	Intercept	−23.93	14.82	−1.61	0.108			
	Top 50 hitsingles	0.02	0.01	1.69	0.092			
	Hitsingle peak position	−0.01	0.00	−4.64	<0.001			
	Letters	−0.96	0.33	−2.90	0.004			
	Year of release	0.01	0.01	1.82	0.070			
	Soul	−0.49	0.46	−1.08	0.282			
	Blues	−1.33	0.70	−1.90	0.059			
	Folk	−0.80	0.47	−1.69	0.092			
	Jazz	−0.57	0.56	−1.00	0.316			
	Electronic	−0.14	0.40	−0.35	0.730			
	Hip hop	−0.46	0.45	−1.01	0.313			
	Alternative/rock	0.24	0.29	0.84	0.401			
	Cardinality	0.02	0.01	2.38	0.018			

Abbreviation: SE, standard error.
$^*p < 0.050$; $^{**}p < 0.005$; $^{***}p < 0.001$.

exposure to cardinal as opposed to oblique artwork to induce longer music listening times. Moreover, we expect that this effect would be mediated by increased album artwork appreciation and song liking.

7.1 | Method

7.1.1 | Participants and design

For this lab study, we used *G*Power* (Faul et al., 2007) to calculate the required sample size to warrant sufficient power. Based on previous research (Latto et al., 2000; Miller, 2007; Plumhoff & Schirillo, 2009) and Study 1, we submitted a small to medium effect size ($f^2 = 0.08$) to an a priori power analysis, setting power at a conventional 80% and $\alpha = 0.05$. This yielded a required sample size of $n = 101$ to obtain the oblique effect under the specified conditions. We used this result as our minimal criterion and continued to sample participants beyond this sample size as long as the allotted lab time allowed us to. Moreover, we only started data analysis after data collection was fully completed.

Using this procedure, we were able to secure a sample of 153 participants,[4] which was more than 1.5 times as high as the power analysis suggested (57% females; mean age: 22.39, SD = 2.65). The study used a one-factorial between-subjects design with album cover

[4]The original, full sample size was 157 participants, but for three participants the music did not play due to a software error in the lab, whereas one further participant quit the study before listening to the music.

TABLE 4 Results of the hierarchical multiple linear regression analysis for weeks presence in the Billboard Top 200 US album charts.

Model	Predictor	Estimate	SE	*t*	*p*	*F*	R^2	ΔR^2
1						13.35***	0.46	—
	Intercept	17.39	5.19	3.35	<0.001			
	Top 50 hitsingles	−0.00	0.00	−1.12	0.263			
	Hitsingle peak position	−0.00	0.00	−9.02	<0.001			
	Letters	−0.07	0.12	−0.61	0.543			
	Year of release	−0.01	0.00	−2.98	0.003			
	Soul	−0.30	0.17	−1.82	0.070			
	Blues	−0.44	0.31	−1.43	0.153			
	Folk	0.00	0.22	0.02	0.984			
	Jazz	−0.29	0.22	−1.29	0.199			
	Electronic	−0.30	0.15	−1.99	0.048			
	Hip hop	0.17	0.17	1.04	0.299			
	Alternative/rock	0.09	0.10	0.87	0.383			
2						12.87***	0.47	0.01*
	Intercept	17.81	5.14	3.46	<0.001			
	Top 50 hitsingles	−0.00	0.00	−1.03	0.306			
	Hitsingle peak position	−0.00	0.00	−8.98	<0.001			
	Letters	−0.09	0.11	−0.79	0.433			
	Year of release	−0.01	0.00	−3.13	0.002			
	Soul	−0.31	0.16	−1.91	0.058			
	Blues	−0.47	0.30	−1.55	0.124			
	Folk	−0.05	0.22	−0.25	0.803			
	Jazz	−0.32	0.22	−1.43	0.154			
	Electronic	−0.32	0.15	−2.10	0.037			
	Hip hop	0.15	0.17	0.92	0.361			
	Alternative/rock	0.09	0.10	0.86	0.389			
	Cardinality	0.01	0.00	2.13	0.035			

Abbreviation: SE, standard error.
**p* < 0.050; ***p* < 0.005; ****p* < 0.001.

artwork orientation (cardinal vs. oblique) as the between-subjects factor.

7.1.2 | Procedure

After asking participants for their age, gender, and nationality, we informed them that a (fictitious) Belgian electronic band had released a new (untitled) album, and as part of a market research study, we invited them to evaluate the artwork of the album's CD and a song from that album. We randomly assigned them either to the cardinal (79 participants) or oblique (74 participants) artwork (see Figure 2), which they were allowed to observe and were free to click away after 10 s (see below for details). The page auto-advanced after 20 s, after which we measured participants' esthetic appreciation of the CD artwork.

Next, we provided participants with a link to the song, ostensibly drawn from the album, and invited them to listen to it. Participants were explicitly instructed that they were free to listen to the song as long as they liked and were free to end the song at any moment by clicking away to the next page of the survey. After free listening, participants rated how much they liked the song.

At the end of the study, we took two control measurements, and rated participants' liking of the genre of the song they had listened to. Finally, participants were probed about their thoughts about the objectives and procedure of the study, debriefed, and thanked for participation. Note that a small version of the CD artwork always remained visible on the screen while participants listened to the song and when they rated the song and cover (size: 200 × 200 pixels).

7.1.3 | Music artwork

In close agreement with past research on the oblique effect (Latto et al., 2000), we used (music-related) artwork that was inspired by the work of the Dutch *de Stijl* painter Piet Mondrian, which was presented in either a cardinal or an oblique (45° tilted) orientation to participants (size: 760 × 760 pixels; see Figure 3 for the stimuli). While we are aware that the use and purchase of CDs are declining vis-à-vis online streaming (but certainly not dying, see, e.g., Christman, 2018), the choice for CD artwork in this study was deliberate. When using quadrilateral album images (cf. traditional or online [e.g., Spotify] album covers), more positive responses associated with cardinal (vs. oblique) images might in principle also be merely a function of the parallelism between cardinal lines in the image and the image's (cardinally oriented) sides, rather than of relative cardinality in the image per se. To exclude this potential confound, we opted to use ecologically valid circular stimuli, which would allow us to rule out this alternative explanation a priori.

7.1.4 | Music

For our music, we selected a song by an existing, yet relatively unfamiliar Belgian electronic band: *The Subs* (see the Supporting Information for more detailed information about the song). The song was downloaded from *YouTube* and converted into an *MP3* file suitable to play on the survey platform used in this study (*Qualtrics*). To avoid any confounding effects that might arise from familiarity or other associations with the band's actual name, we opted for a fictitious band name in the cover story (i.e., The BogZ). Depicting the band's name in a horizontal position on both CDs additionally allowed us to parsimoniously manipulate relative cardinality without creating the impression that the oblique cover was merely a tilted cardinal one. None of the post-experiment probing questions indicated that participants perceived the oblique CD as a cardinal one in disguise (see Figure 3).

7.1.5 | Music consumption

We used free listening time to the song (in milliseconds) as our main dependent variable, recorded as the elapsed time between entering the page where the link to the song was provided, and clicking the button next to advance to the next page, with longer listening times indicating a more positive evaluation of the music (IFPI, 2015; Plumhoff & Schirillo, 2009). We log-transformed the listening time data, to correct for positive skew.

7.1.6 | Artwork/song/genre evaluations

We measured participants' appreciation of the CD artwork using a three-item measure adapted from Fayn et al. (2015): "pleasing–displeasing," "enjoyable–unenjoyable," "ugly–beautiful," using 7-point bipolar scales ($M = 3.62$, $SD = 1.54$, $\alpha = 0.92$). We used the same three items to gauge participants' song liking but additionally asked them whether they found the song "good–bad," "cool–uncool," and "my thing–not my thing" (using 7-point bipolar scales, $M = 3.02$, $SD = 1.48$, $\alpha = 0.95$). Artwork appreciation and song-liking indices were created by averaging the corresponding items with higher scores indicating more positive evaluations.

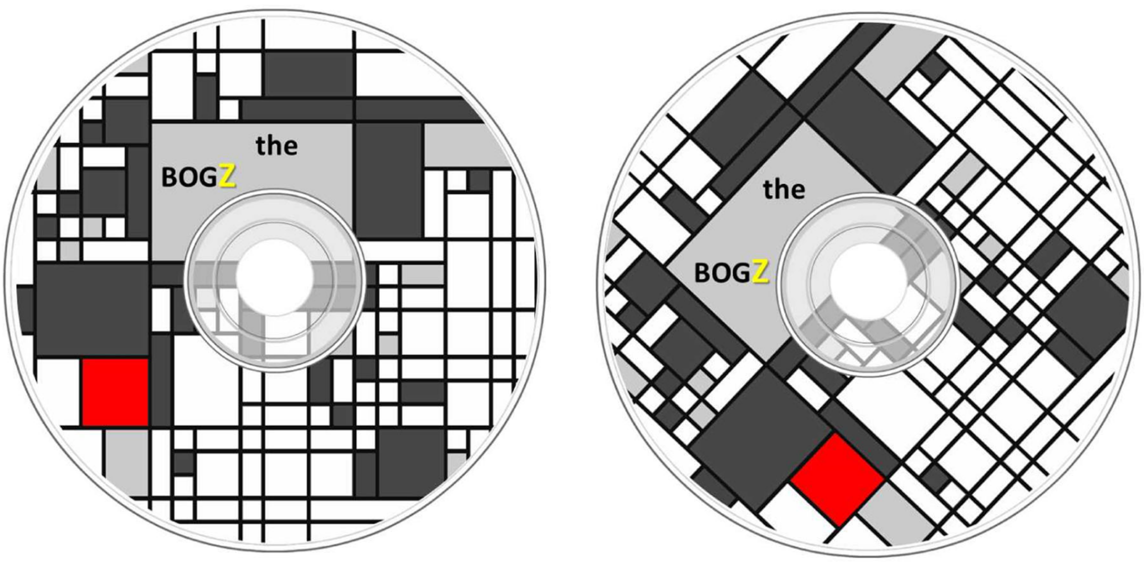

FIGURE 3 The cardinal (left) and oblique (right) album covers used in Study 2.

We assessed participants' general liking of the song's genre—electronic music (1 = *I dislike this music style very much* to 7 = *I like this music style very much*)—to be able to rule out the possibility that listening time and song/artwork liking are merely affected by one's general liking of this particular music genre ($M = 3.58$, $SD = 1.91$). Indeed, previous research has identified general and chronic music genre liking as one of the most important and stable predictors of responses to (new) music (Corrigall & Schellenberg, 2015; Holbrook & Gardner, 1993; Istók et al., 2013) thus underscoring our decision to rule out this factor as an alternate account of our notions (see also Meyvis & van Osselaer, 2017; Wang et al., 2017 for an overview of conditions that justify including theoretically relevant covariates in target analyses). Genre liking did not differ significantly between the cardinal ($M = 3.73$, $SD = 1.84$) and oblique condition ($M = 3.41$, $SD = 1.97$), $F(1, 151) = 1.14$, $p = 0.288$, partial $\eta^2 = 0.01$.

7.1.7 | Control measures

We assessed participants' familiarity with the work of Mondrian by checking whether they were aware that the CD artwork was adapted from paintings by Piet Mondrian (1 = *totally unaware* to 7 = *very much aware*, $M = 2.69$, $SD = 2.24$) and asked them how important music was in their life (1 = *not at all important* to 7 = *extremely important*, $M = 5.75$, $SD = 1.20$).

7.2 | Results and discussion

7.2.1 | Preliminary analyses

The results of 2 one-way analysis of variances (ANOVAs) show that there are no statistically significant differences between the two conditions in terms of awareness that Mondrian art is displayed (cardinal: $M = 2.76$, $SD = 2.23$; oblique: $M = 2.61$, $SD = 2.26$) and in terms of the importance of music in participants' lives (cardinal: $M = 5.77$, $SD = 1.12$; oblique: $M = 5.72$, $SD = 1.29$; all $Fs < 1$). Hence, our manipulation appears not to be confounded by these two variables and so these will not be discussed further.

7.2.2 | Impact of orientation on music consumption

Next, we performed a one-way analysis of covariance (ANCOVA), with album artwork orientation (cardinal vs. oblique) as the between-subjects factor and free listening time as the dependent variable, while controlling for music genre liking. This analysis shows a significant main effect of artwork orientation on free listening time—$F(1, 150) = 5.41$, $p = 0.021$, partial $\eta^2 = 0.035$. Indeed, in line with H2, cardinal artwork induces positive evaluations of the music as evinced by significantly longer listening times ($M = 67.28$ s, $SD = 55.69$) as compared to oblique artwork ($M = 47.22$ s; $SD = 31.23$; untransformed M and SD are reported for readability).[5]

Two additional one-way ANCOVAs (controlling for genre liking), reveal that, in contrast to H1, while artwork orientation does not have a significant effect on artwork appreciation (cardinal: $M = 3.59$, $SD = 1.50$; oblique: $M = 3.65$, $SD = 1.59$; $F < 1$), it does affect song liking in line with the results on listening time, such that the song is rated significantly more positive in the cardinal ($M = 3.29$, $SD = 1.44$) than in the oblique album condition—$M = 2.73$, $SD = 1.47$; $F(1, 150) = 4.45$, $p = 0.037$, partial $\eta^2 = 0.029$.

7.2.3 | Mediation analysis

Given that artwork orientation has a pronounced effect on free listening time and song liking, and considering the fact that both outcomes are also positively correlated, $r(151) = 0.38$, $p < 0.001$, we examine whether the effect of artwork orientation on song listening time is mediated by song liking (while controlling for music genre liking) using the PROCESS macro (Hayes, 2017; version 3.0) model 4 with 5000 bootstrap samples. Results indicate that artwork cardinality indeed positively predicts song liking—$B = 0.458$, $SE = 0.217$, $t(150) = 2.11$, $p = 0.036$, unstandardized coefficients—which, in turn, positively predicts listening time—$B = 0.075$, $SE = 0.016$, $t(150) = 4.61$, $p < 0.001$. Moreover, the indirect effect of cardinal (vs. oblique) artwork on listening time via song liking is also significant as its bias-corrected 95% confidence interval does not include zero (confidence interval [CI]: 0.001 to 0.078).[6]

This finding suggests that cover artwork cardinality induces longer free listening times, driven by increased song liking. Nevertheless, the lower limit of the confidence interval, only just exceeding zero, suggests that this indirect effect is at most of modest size. In addition, we do not observe that the artwork orientation manipulation affects the artwork appreciation measure, thus failing to support H1. This might be due to the oblique effect likely being an implicit effect, operating outside conscious awareness, and thus being less amenable to being picked up by explicit self-report measures like the one used presently.

Nevertheless, the present results dovetail with the findings of the secondary study (Study 1) and demonstrate the relevance of the (subtle) oblique effect on consumer judgment and choice of consumer products, as indicated by longer song listening and increased song liking. Interestingly, we find the effects even in the absence of any basic synesthetic cross-modal correspondence

[5]The result on listening time of the ANOVA without the covariate genre liking is $F(1, 151) = 5.87$, $p = 0.017$.

[6]Note, in addition to these power analyses using *G*Power*, we also conducted power analyses for the indirect effects in Studies 2 and 3 using the paper by Fritz and MacKinnon (2007) who provided tables with sample sizes for mediated models with 80% power and $\alpha < 0.05$ for effect sizes of different magnitude. These authors recommend a sample size of $N = 124$ for joint significance models (as used by PROCESS) with small to medium effect sizes for the *a* and *b* paths. Both Study 2 and Study 3 had sample sizes that were well above this threshold.

between the visual (the CD cover) and the auditory (the song) stimuli (Hagtvedt & Adam Brasel, 2017).

Compared to Study 1, the present results more unequivocally demonstrate that merely seeing an album cover can affect the actual listening experience of the music on the album (a cross-modal effect from a visual source stimulus to an auditory esthetic experience, rather than vice versa)—that is, consumers listen longer to songs from a cardinally oriented as opposed to an obliquely oriented album cover. Note that the results from the mediation analysis underscore that listening times indeed captured song liking, with better liking translating into longer listening times (IFPI, 2015), thus ruling out alternative explanations for the increased listening times.

We obtained our results in a controlled lab setting, with stimuli that avoid the potential confounding effect of typical quadrilateral album artwork (e.g., album sleeves). Yet, the critical reader may remark that we only exposed participants to one piece of music and corresponding artwork, thus raising the question of whether the effect would be robust across a larger and stylistically more diverse sample of music/artwork. In addition, while the explicit request to observe the artwork allowed us to ascertain that the impact of cardinality on music consumption was attributable to visual attention to the cover artwork, the next study used a more ecologically valid approach to expose participants to music artwork.

Following up on Study 2, Study 3's main aim is to find converging evidence for the basic cross-modal effect of album artwork line orientations affecting consumer listening experiences (as per H2) while demonstrating its robustness across various conditions. That is, the next study more closely connects with how consumers are typically exposed to music artwork in a music selection context, such as those found online and on streaming services. While participants again were free to listen to the songs, we now presented them with more than one album cover and song and made sure that each song/album belonged to a different music style. Moreover, we used a different, more ecologically prevalent indicator of song and artwork liking which is typically found online—that is, star ratings. These star ratings can also be viewed as a more implicit and holistic evaluation measure than the one used in the previous study (cf. Chen, 2017), thus possibly increasing the likelihood of observing an effect of our manipulation on this particular artwork appreciation measure. In addition, in this study, the cover art appreciation measure preceded the song liking measure, possibly giving rise to demand effects. Hence, to account for this possible bias, we reversed the order of these two measures in Study 3. Finally, the next study again aims to explore support for the proposed affect misattribution account (as per H3).

8 | STUDY 3

In extension of Study 2, in the current study, we (incidentally) expose consumers to a stylistically varied selection of songs and types of album artwork, without any explicit instruction to observe and evaluate the artwork. We align with the previous study in using free listening time as the main behavioral indicator of music consumption, but extend that study's design by using star ratings to assess more implicit album cover artwork appreciation and song liking. Finally, we test our hypothesis on a nonstudent sample, and use a pretest of participants' general familiarity with, and preference for, each music fragment and artist/band.

8.1 | Method

8.1.1 | Participants and design

In line with the previous study, we determined the sample size for the present experiment before data collection with an a priori power analysis. Based on the effect size of the main analysis of artwork cardinality on listening time obtained in the previous study (partial $\eta^2 = 0.035$), we calculated the required sample size using *G*Power* (Faul et al., 2007; using 80% power and $\alpha = 0.050$). This yielded a sample size of 220. We decided to sample well over this number of participants given that we aimed to conduct the study online using Amazon Mechanical Turk, which we deemed could have an a priori unknown influence on sample attrition and on the effect sizes obtained. Using this procedure, we were able to secure a sample that was more than twice as high as the power analysis suggested (i.e., a full sample of 500 participants; 49% females). Similar to the previous study, we only started data analysis after data collection was fully completed. We used a mixed design, with album cover orientation (cardinal vs. oblique) as the between-subjects factor, and type of song fragment as a within-subjects factor.

8.1.2 | Procedure

After providing information about their gender and nationality, participants were randomly assigned to either the cardinal ($n = 250$) or oblique ($n = 250$) album cover condition. Within each condition, there were three trials in which participants were requested to listen to and evaluate a song. We counterbalanced trial order across participants, thus ruling our order effects as an alternative explanation of our findings.

Each trial began by simultaneously presenting an album cover and a link to the song that was (ostensibly) drawn from the album, but without any additional instructions that could unduly steer attention to the cover, thus preventing any demand effects or contingency awareness. When participants clicked on the song link they could listen to the song as long or as many times as they liked. After listening, participants were asked to rate the song. To further prevent any demand effects we asked participants to rate the album cover artwork and to indicate their general liking of the song's genre at the very end of each individual trial.

At the end of the study, we took three control measurements, probed participants about their thoughts about the objectives and procedure of the study, debriefed, thanked, and dismissed. Like in

Study 2, a small version of the CD artwork remained visible on the screen while participants listened to the song and when they rated the song and cover (size: 200 × 200 pixels).

8.1.3 | Covers

We created cardinal ($n = 3$) and oblique ($n = 3$) album covers for three existing bands/artists from different music genres (rock: Pieter-Jan De Smet; singer-songwriter: Adrian Borland; electronic: The Subs).[7] These covers were identical across the two album cover orientation conditions, except for their orientation (see Figure 4 for the stimuli used). Replicating and extending the previous study, for all three album covers, orientation was manipulated by either or not tilting the album cover image.

To create additional visual diversity in our cover set, we varied the cover artwork on several additional dimensions, that is, in terms of presence/absence of representational content (e.g., abstract patterns vs. an aerial view of suburban Los Angeles), of visual complexity, of type of cardinality (vertical, horizontal, or both), of coloring, and of the presence/absence of album titles (in addition to the band/artist's name).

8.1.4 | Songs

For our selection of song fragments, we opted for fairly popular and/or accessible music styles, while making sure that artists and songs would be generally unknown to participants. We compiled 1-min song fragments ostensibly drawn from these albums. These fragments were from existing songs from the artists/bands under consideration, downloaded from *YouTube*, and converted into *MP3* files suitable to play on the survey platform used in this study (*Qualtrics*).

8.1.5 | Music consumption

Similar to Study 2, we used participants' free listening times to the songs as our main dependent variable, with prolonged listening times indicating a more positive evaluation of the music (IFPI, 2015; Plumhoff & Schirillo, 2009). We again log-transformed this variable to correct for positive skew.

8.1.6 | Artwork/song/genre evaluations

To assess cover artwork appreciation and song liking, we extended the previous study by using a more implicit, holistic, and ecologically valid way of measuring evaluations. Specifically, inspired by the classic five-star ratings of *iTunes*, one of the leading service providers in online music streaming, participants indicated their evaluation of the covers ($M = 2.84$, SD = 0.83) and songs ($M = 2.59$, SD = 0.83) by assigning stars (1–5). Like in Study 2, we also gauged how much participants generally liked the song genre (7-point scale, from *I extremely dislike* to *I extremely like*), allowing us to assess the impact of cover artwork cardinality on music consumption while accounting for the impact of general genre liking ($M = 4.81$, SD = 1.07; cf. Meyvis & van Osselaer, 2017; Wang et al., 2017).

8.1.7 | Control measures

Finally, we asked participants to indicate how familiar they were with each of the three songs and artists/bands (1 = *very unfamiliar* to 7 = *very familiar*), and how important music was in their life (1 = *not at all important* to 7 = *extremely important*, see Table 5). Genre liking across the three albums did not differ significantly between the cardinal ($M = 4.74$, SD = 1.06) and oblique condition ($M = 4.87$, SD = 1.08; $F(1, 498) = 1.91$, $p = 0.167$, partial $\eta^2 = 0.00$).

8.2 | Results and discussion

8.2.1 | Preliminary analyses

First, a one-way ANOVA reveals that in the cardinal condition ($M = 5.51$, SD = 1.38) participants consider music significantly less important in their life than in the oblique condition, ($M = 5.78$, SD = 1.31), $F(1, 498) = 4.95$, $p = 0.027$, partial $\eta^2 = 0.01$. Adjusting for this variable in our target analysis did however not alter the results in any way, so this variable will not be discussed any further. As is clear from Table 5, participants are generally highly unfamiliar with the songs and artists. While there is a statistically significant difference between Song 1 and Song 3 for song familiarity, none of the target songs/artists shows a systematically different response pattern compared to the others for the familiarity measures.

We next performed a mixed model ANOVA with cover orientation as the between-subjects factor and type of song fragment as the within-subjects factor, to explore whether the effect of artwork orientation on our main DVs—listening time, album cover appreciation, and song liking—differed across type of song fragments. These analyses (Huynh-Feldt correction for song liking) reveal no significant interactions between orientation and type of song for

[7]Note that we showed participants a fourth album cover. Unlike the other three covers, for this fourth album, we did not manipulate cardinality by tilting a cover image having predominantly cardinal line/edge orientations, but rather by drawing cardinally or obliquely oriented lines over the image (which was a black-and-white photo of the triphop artist Tricky). While this manipulation might have introduced *some* cardinality (or obliqueness) in the image, the level of cardinality (or obliqueness) of the cover is necessarily lower than that of the other three covers. In addition, we observed that participants liked triphop significantly less than all three other song genres (all $ps < 0.050$), and considered both the song and artist under consideration as significantly more familiar than the other three songs and bands/artists (all $ps < 0.001$). Given that this album thus turned out to be an outlier in these respects, we decided not to include it in our analyses (although including it does not substantially alter the results on listening time, $F(1, 497) = 4.39$, $p = 0.037$, $\eta^2 = 0.01$, cover liking, $F(1, 497) = 3.10$, $p = 0.079$, partial $\eta^2 = 0.01$, or song liking, $F < 1$).

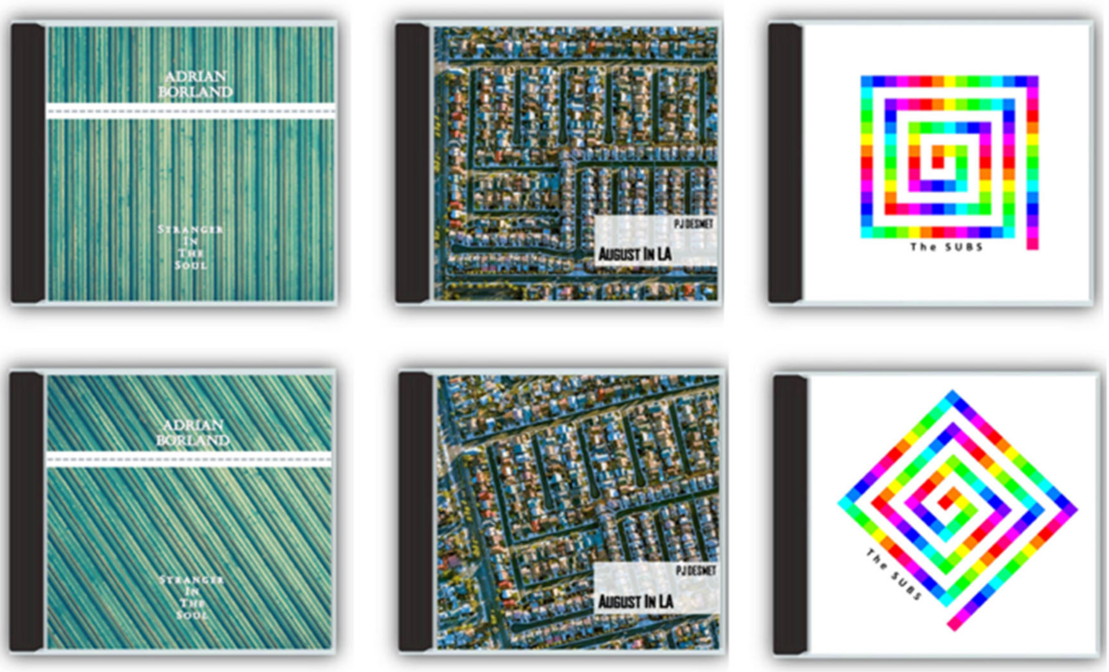

FIGURE 4 The cardinal (upper row) and oblique album (lower row) covers used in Study 3. Note that the listening order was counterbalanced across participants.

TABLE 5 Mean scores and standard deviations (between brackets) on the familiarity measures.

	Song 1	Song 2	Song 3
Artist/band familiarity	1.35 (0.82)$_a$	1.36 (0.87)$_a$	1.39 (0.92)$_a$
Song familiarity	1.36 (0.80)$_a$	1.39 (0.90)$_{ab}$	1.41 (0.93)$_b$

Note: Different subscripts per row indicate significant differences at $p < 0.050$. Song 1: Adrian Borland; Song 2: Pieter-Jan De Smet; Song 3: The Subs.

listening time, $F < 1$, nor for song liking, $F(1.90, 947.88) = 1.82$, $p = 0.165$, or cover liking, $F(2, 996) = 1.89$, $p = 0.151$. Hence, the type of song fragment does not constitute a confound in this study, which allows us to aggregate measures over all three songs for our target analyses.

8.2.2 | Impact of orientation on music consumption

Similar to Study 2, the results of an analysis of covariance on free listening time with album cover orientation (cardinal vs. oblique) as the between-subjects factor, while controlling for genre liking parallels the previous findings and yields the expected effect, supporting H2 $F(1, 497) = 4.88$, $p = 0.028$, partial $\eta^2 = 0.01$.[8] Indeed, inspection of the means shows that in the cardinal condition, participants listen longer to the songs ($M = 64.20$, $SD = 37.71$) than in the oblique condition ($M = 60.90$, $SD = 40.08$; untransformed M and SD are reported for readability).

Two additional one-way ANCOVAs controlling for genre liking reveal that, while artwork orientation does not have a direct effect on song liking (cardinal: $M = 2.58$, $SD = 0.82$; oblique: $M = 2.61$, $SD = 0.83$; $F < 1$), it does affect album cover appreciation, in line with H1, $F(1, 497) = 3.83$, $p = 0.051$, partial $\eta^2 = 0.01$, such that cardinal covers receive more stars ($M = 2.90$, $SD = 0.83$) than oblique covers ($M = 2.78$, $SD = 0.83$).

8.2.3 | Mediation analysis

All three variables of interest—listening time, album cover appreciation, and song liking—correlate positively with each other (listening time—song liking: $r(498) = 0.37$, $p < 0.001$; listening time—album cover appreciation: $r(498) = 0.20$, $p < 0.001$; song liking—album cover appreciation: $r(498) = 0.59$, $p < 0.001$). Hence, given that artwork orientation has a pronounced effect on free listening and cover appreciation, and that all three measures of interest mutually correlate, we may test the full affect misattribution account summarized by H3 (see Figure 1) by examining whether cover artwork cardinality would affect prolonged listening time via a visual to auditory affective transfer, that is, via cover appreciation and song liking. To this end, we performed a serial mediation analysis using PROCESS (Hayes, 2017; version 3.0, model 6). We tested the full model while controlling for genre liking. The results show that the

[8]The result on listening time of the ANOVA without the covariate genre liking is $F(1, 498) = 3.38$, $p = 0.067$, $\eta^2 = 0.01$.

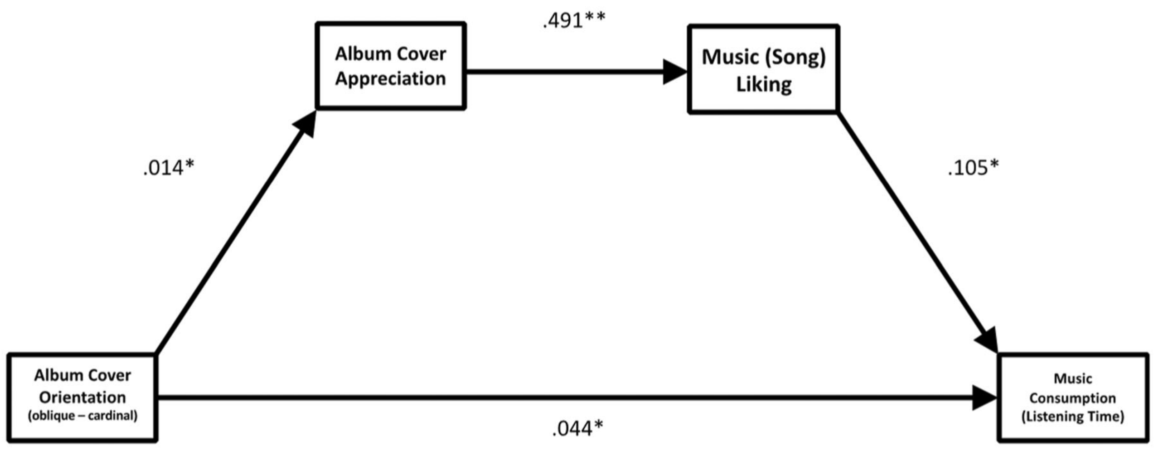

FIGURE 5 Serial mediation results of Study 3.

direct effect of album cover line orientation on music consumption (listening time) is significant: $B = 0.044$, $SE = 0.072$, $t(497) = 2.67$, $p = 0.008$ (unstandardized coefficients, see Figure 5 for the coefficients for all paths and their significance). Moreover, album cover cardinality positively affects album cover appreciation as per H1 ($B = 0.014$, $SE = 0.019$, $t(497) = 1.96$, $p = 0.05$), which in turn predicts song liking, in line with H3 ($B = 0.491$, $SE = 0.033$, $t(497) = 14.87$, $p < 0.001$). Finally, song liking positively predicts listening time in line with H3 ($B = 0.105$, $SE = 0.016$, $t(497) = 6.51$, $p < 0.05$). Moreover, the full indirect effect implied by the affect misattribution account (cover orientation → cover appreciation → song liking → listening time) controlling for genre liking is significant as the CI does not include zero (95% CI: 0.0001 to 0.0156).[9] Thus, consistent with the affect misattribution account and H3, the positive affective response to the cardinally oriented album cover is misattributed to the (affectively unrelated) song fragment, which in turn predicts prolonged music listening times.

We should note that the results of Studies 2 and 3 did not fully converge, thus these studies do not offer unequivocal support for mediation via affect misattribution as the underlying driver. Nevertheless, the present results suggest that the more implicit cover appreciation measure used in this study may have been better able than the one used in Study 2 to pick up on the subtle, implicit oblique effect. Also, while the serial mediation analysis shows a significant indirect effect via album cover appreciation in line with the affect misattribution account and H3, the indirect effect size is modest as evidenced by the confidence interval just exceeding zero. Finally, the use of star ratings for both cover art appreciation and song liking may have induced a certain extent of common method variance, which may have artificially inflated the correlation between the two constructs. However, the extent of this shared method variance might be modest since the reversed serial mediation analysis (see Footnote 9) showed that the reversed model was not significant, which would be inconsistent with the notion that the correlation between both constructs is largely or entirely driven by using the same method of measurement.

[9]To assess the robustness of the model we also tested the alternative where we switched the causal order of album cover appreciation (M1) and song liking (M2). However, this model did not fit the data as the CI of the indirect effect included zero (CI: −0.0019 to 0.0015). Hence, the results suggest that cover art appreciation influences song liking, rather than vice versa.

9 | GENERAL DISCUSSION

The present research aims to contribute to research on the impact of basic visual package design features on consumer responses to brands and products. As a case in point, we introduce the oblique effect in music album cover artwork and examine its impact on consumer judgment and choice, both at the individual and at the market level. More specifically, the present work focuses on the extent to which album cover artwork displays a prevalence of cardinal over oblique line/edge orientations and shows how the relative cardinality of album artwork positively affects appreciation of the artwork and music consumption and predicts the album's market performance in terms of various indices (album chart peak performance, expert ratings and duration of staying in the album charts).

Study 1 indicates that album covers with a high prevalence of cardinal line/edge elements compared to their more oblique counterparts have a higher chance of becoming esthetically appreciated, ending up higher in the US charts, receiving higher expert ratings, and staying longer in the album charts, even after adjusting for a host of third variables. The observation that esthetic appreciation (as witnessed by the presence of the albums on websites that rated the album covers as either appealing or non-appealing) is a function of album cover orientation may have raised the question of whether these ratings were made while the music was moving up or down the charts. If so, then perhaps a reverse spillover might have been possible, i.e., one where the judges for these websites may have appreciated the cover art more if the song/album was liked more or more popular.

Although it might be possible that some of the judgments on the esthetic appreciation of some album covers may have been made while these albums were still in the process of moving up or down the charts, this -by definition- can only have been the case for those albums that were released since the time the websites that published these ratings and that we consulted were founded, but not earlier. Hence, using a conservative cut-off point, any album whose release date lies before the advent of the internet (i.e., albums preceding 1991) cannot be affected by this confound (note that our set of albums spans the release years 1956–2013). For those albums for which this applies, we acknowledge that we cannot rule out the possibility that a reverse spillover effect has occurred, i.e., that liking the songs on the album or their popularity may have affected the esthetic appreciation of the cover art, rather than vice versa, but this possibility seems not very likely, given our results. First, if so, it would have been unlikely that we would have observed the effect of album cover orientation on esthetic appreciation that we report in Study 1, accounting for a host of control variables, covariates, and confounds. Moreover, we found that this effect also holds when controlling for the number of top 50 hitsingles by the artist, as well as when controlling for the highest peak position of any hitsingle on the album, both of which may be viewed as markers of the album's popularity. Finally, Study 3 was able to more unequivocally demonstrate that cover art appreciation was a function of album cover artwork line orientation, while the mediation analysis reported for Study 3 also showed that song liking was a function of cover art appreciation, rather than vice versa since the reverse mediation analysis did not show a good fit to the data.

We use album peak position in the US charts, expert ratings (of *Rolling Stone* magazine), and duration (in weeks) of presence in the charts as markers of market performance of the albums, but we acknowledge that market performance is not the same as market success, for which our markers may be too incidental to signal continued "staying power" in the market, even the duration measure. Thus, future studies interested in assessing enduring market success could consider including *continued*, *longitudinal* top performance in the market as indicated by the number of years a given song or album remains highly ranked, the number of songs and albums of the artist that remains high in the charts over the years, and the size of the artist's revenues over the years from album, single and streaming sales, concerts and merchandise. Indices like these might be fruitfully analyzed using Cox proportional hazards survival regression (see, e.g., Vadakkepatt et al., 2021 for a recent example).

While the strength of Study 1 lies in the use of real-world data, its cross-sectional nature does not say anything about the causal direction of the observed effects. In Studies 2 and 3, we therefore test for causality, and in Study 2, we show that a single exposure to cardinal album artwork from various artists/genres boosts listening times of the songs drawn from the albums, mediated by more positive evaluations of the song. However, this study does not provide evidence for the impact of album cover line orientations on esthetic appreciation (H1). Study 3 again examines the entire causal sequence implied by the affect misattribution account of the oblique effect and *does* show that album cover orientation affects album cover appreciation which in turn affects listening times through an indirect effect via song liking. Thus, while artwork orientation in Studies 2 and 3 consistently yielded the predicted effects on our target DV—listening time—support for the proposed underlying affect misattribution process did not converge across these two studies and thus requires additional research attention. Future research using experimental designs might also include a no cover artwork control condition to assess what direction the oblique effect actually takes: Is cardinally oriented artwork perceived as more appealing or is oblique artwork perceived as less appealing compared to a no artwork control condition? Of course, including such a condition would also introduce the confound of not including any visual stimulus at all, so possibly a perfectly balanced orthogonal/oblique album cover condition might actually be more suitable to address this question.

In terms of our hypotheses, across studies, we thus find consistent support for H2, showing that album cover cardinality consistently boosts individual music consumption (Studies 2 and 3) and market performance in terms of expert reviews, album peak position, and duration of presence in the charts (Study 1). In contrast, support for H1 and H3 is inconsistent with Study 2 failing to support both. H1 does receive support in Study 1 and Study 3, and H3 is supported in Study 3. This heterogeneity might signal random variation in effect sizes, which, in case of small to moderate effect sizes, by necessity will hover around and sometimes capture, null results (Kenny & Judd, 2019). However, it may also partly reflect the changes in procedure and measurement formats from Study 2 to Study 3. More in particular, given that affective processing of visual and auditory stimuli to a large extent takes place outside conscious awareness (LeDoux, 1998; Tamietto & De Gelder, 2010), our self-report measure for album cover appreciation in Study 2 may simply have not been sensitive enough to reliably pick up these effects. This suggestion is supported by the observation that the more holistic, implicit album cover star ratings used in Study 3 *were* able to pick up the oblique effect. Thus, future research might profitably supplement the presently used measures with additional and validated implicit evaluative measures (see, e.g., Nosek et al., 2011 for an overview). In addition, while the ANCOVA results were robust, the mediation models in Studies 2 and 3 showed indirect effects that were significant, but with confidence intervals that just excluded zero. Thus, also from this perspective, the evidence for the indirect effects is tentative and in need of future replication.

However, the observation that support for affect misattribution as the proposed underlying process was not unequivocal in our studies, does not necessarily rule it out as a possible candidate for such a process. Indeed, absence of evidence does not equal evidence of absence. Hence, in addition to using different measurement instruments as argued above, future research might seek to establish more unequivocal empirical support for the proposed relationships and particularly the underlying mechanism of affect misattribution by using the validated Affect Misattribution Procedure (AMP) as extensively discussed by Payne and Lundberg (2014). The reason the present research did not rely on this validated paradigm was that we wanted to use real consumer products as primes (album covers) and actual consumption behavior and market performance indices as outcomes, rather than the more artificial primes and responses of the original paradigm. Hence, marketing and consumer behavior relevance drove us to use the designs and measures used in the present work, but we acknowledge that this substantive relevance came at the cost of paradigmatic rigor with regard to the presumed underlying process. When future research using the AMP would indeed yield further support for a misattribution process, the playing field of the oblique effect in the consumer sphere might even expand. One could for example test whether pairing a variety of products with other visual stimuli high on cardinality—for example, its brand or packaging—also leads to an affective transfer from the (positive) experience of cardinality of the brand/package to the product itself.

While the critical reader might argue that cover art has become less consequential in the present age of purchasing and consuming music online, research actually suggests otherwise: a majority of consumers (75%) prefer cover artwork to be visible when purchasing music online (Cook, 2013), and audiophiles still put great importance in the tactile and visual value of actual—i.e., tangible—music albums (Styvén, 2010). In addition, for leading streaming services like *Spotify* or *iTunes* it is standard practice to depict album covers while playing music. If anything, artwork may nowadays even be *more* salient and important than in the past, when the vinyl or CD needed to be removed from the sleeve/box, and artwork was not visible upon selecting and playing songs.

Future research (using secondary data) might extend the findings from this study by—for example—examining whether mass standardization in the industrial era caused an increased and easier reliance on cardinal orientations in product design, and whether this evolution could have possibly influenced consumer desires and spending compared to the preceding, preindustrial, period. Relatedly, further manifestations of the oblique effect in the consumer sphere could also be explored; for instance, by testing whether this effect underlies the relative preference for prepackaged, boxed-up consumer products versus unpackaged ones (e.g., cereals in a box vs. bag), or whether it is evident from the consumer preference for cardinally over obliquely oriented brands and logos.

While we note that the proportion of variance explained by the oblique effect in album market performance is perhaps modest, it remained significant when accounting for third variables and was consistent across three different indices of such performance. This modest proportion reflects the subtlety of the phenomenon and is also expected, given that album covers are not obviously or necessarily related to musical content and quality. Nevertheless, considering the size of the music market (estimated at 14,966 million US dollars in 2014; IFPI, 2015), even small effects might yield significant commercial/financial returns. Thus, despite its subtlety, the present findings suggest that seemingly trivial visual features may substantially influence consumers (and manufacturers) of commercially available products.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ORCID

Bob M. Fennis http://orcid.org/0000-0003-4738-7524

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