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Weapons of Mass Distraction: Optimal Innovation and Pleasure Ratings

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In 6 experiments we test the Optimal Innovation Hypothesis, according to which an optimally innovative stimulus, such that induces a novel response while allowing for the recovery of a salient one (Giora, 1997b, 2003), would be rated as more pleasing than either a more or a less familiar stimulus. Experiment 1 shows that it is the stimulus that meets the requirements for optimal innovativeness that is most pleasurable. Reading times obtained in Experiment 2 support the assumption that the stimuli found most pleasurable involve processing a salient meaning. Experiment 3 corroborates the results of Experiment 1 and Experiment 2, showing that they also hold for identical (rather than different) stimuli. Experiment 4 controls for the possibility that the lengthy reading times found earlier might reflect lack of understanding. Experiment 5 shows that optimal innovation supersedes figurativity. Experiment 6 demonstrates that the Optimal Innovation Hypothesis applies to nonverbal stimuli as well.

In *The Madness of George Dubya*—a recent theater show (London, May, 2003)—the playwright Justin Butcher criticizes the American and British mainstream pro-

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paganda by referring to it as *"weapons of mass distraction."* This neologism allows the audiences an insight into the all too familiar "weapons of mass destruction," the catchphrase by which these governments lured the masses into accepting the occupation of Iraq.

In 1997 David Reeb, an Israeli artist, created a series of works titled *Let's Have Another War*, reflecting, what he considered to be, the intolerable ease and casualness with which Israelis wage wars. The exhibition included paintings showing Israeli tanks aiming at poor Palestinians' homes. The phrase "let's have another … " is highly frequent and familiar, inviting some expected, mundane, positive completion. Its final ironic spin in this title is, therefore, innovative and startling.

Piven, an Israeli caricaturist, carved the portrait of current Israeli Prime Minister Ariel Sharon from minced meat (for the face), lamb's wool (for the hair), black fur (for the jacket), and leather (for the tie). The familiar portrait of Sharon is easily recognized in spite of the unpredictable materials from which it is made. For many these materials highlight what they take to be the murderous nature of the man. They bring out the carnivorous wildlife butcher–butchered aspects of the man's character (Piven, 1999).

These novel discourses are instances of "optimal innovations;" they are innovations that allow the recognition of a familiar experience (Freud, 1960). In this article we aim to show that the involvement of the familiar in the novel accounts for the pleasure we derive from the innovative. Rather than pure novelty (Brinker, 1988; Gerard, 1764; Home, 1765), it is optimal innovation, innovation that involves a spin on the familiar that is most pleasing (the Optimal Innovation Hypothesis). The familiar, then, sugars the pill of pure novelty.

THE OPTIMAL INNOVATION HYPOTHESIS

In this article, we test the hypothesis that pleasurability or liking is a function of optimal innovation (1). Before testing the hypothesis, let us first define the notion of optimal innovation (2).

(1) The Optimal Innovation Hypothesis - Pleasurability is sensitive to optimal innovation.
(2) Optimal innovation - A stimulus would be optimally innovative if it involves
    (a) a novel—less or nonsalient—response to a given stimulus, which differs not only quantitatively but primarily qualitatively from the salient response(s) associated with this stimulus and
    (b) at the same time, allows for the automatic recoverability of a salient response related to that stimulus so that both responses make sense (e.g., the similarity and difference between them can be assessable (see also Giora, 2002, 2003, 176–184).

For a response (e.g., a meaning) to be salient, it should be foremost on our mind due to factors such as experiential familiarity, frequency, conventionality, or prototypicality (see Giora, 1997b, 2003, 13–38). Responses low on these dimensions would be less salient. Responses not coded in the mental lexicon are nonsalient. Salient and less salient responses get activated automatically upon encounter of a familiar stimulus, regardless of context fit, but are ordered; salient responses are activated faster. To the extent that a linguistic innovation (*"Siege the moment; a peace of paper"*) allows an insight into some salient meanings (*Seize the moment; a piece of paper*) while promoting new ones (*Hurry to impose a curfew; a worthless peace agreement*), it is optimally innovative.

The definition of novelty assumed here should await further research (but see also Berlyne, 1971). Suffice it to say, however, that the novel response posited here should involve a conceptually different response than the one designated by the salient response. Thus, even though the variant variation (*a single piece of paper*) might be somewhat more novel than the familiar (*a piece of paper*), it is not innovative enough in the sense that it does not involve a discretely different conceptual meaning than the one activated by the familiar original from which it stems. Rather, both the familiar and the variant refer to the same concept (*a sheet of paper*) to which the variant stimulus contributes no additional qualitatively different response. In contrast, in addition to a salient response (*a sheet of paper*), optimal innovations (*a peace of paper*) further involve a qualitatively different response/concept (related to peace and political agreements).

By definition, then, the notion of optimal innovation excludes familiar stimuli (*a piece of paper*); familiar stimuli do not meet the requirement in 2b. However, the notion of optimal innovation also excludes innovations such as variants of such stimuli as well as pure innovations. Variants (*a single piece of paper*), which stem from the familiar (*a piece of paper*), do not meet the first requirement (2a). Although they involve a slight modification, this alteration does not result in a novel, qualitatively different response (as opposed to, e.g., *"a peace of paper"*). Neither are pure innovations (*"a pill of pepper"*) optimal, as they do not meet the second requirement (2b). Taken as a discourse unit, no familiar response (e.g., *a piece of paper*) is recoverable for the string as a whole so as to affect the novel response (by, e.g., inducing surprise, comparison, etc.).[1]

By definition the notion of optimal innovation also supersedes the classical association between figurative language and poetics. It implies, instead, that it is neither literality nor figurativity that accounts for optimal innovativeness and the pleasure inducible thereof. Rather, it is some optimal novelty, that which involves salient and less or nonsalient responses, regardless of figurativeness, that

[1] *"A pill of pepper"* might be made up of constituents each of which involving some salient meaning. However, as a whole, they do not make up a familiar unit that has a salient meaning of its own (as do fixed expressions, for instance).

accounts for aesthetic judgments. For example, *Sofa So Good*, the name of a London shop, constitutes a literal pun. It introduces a novel meaning that recommends its goods (furniture). Yet it does not dispense with the salient literal meaning of the string *so far so good*. Or take *Curl up and Dye*, the name of a hair salon in Chicago[2] — which deautomatizes *Curl up and die*, a familiar collocation saliently denoting depression — while projecting an ironic attitude toward it yet not without promoting a novel literal interpretation. Similarly, *Sharon Stone*, the title of a piece of art by Lahav Halevi (2002) featuring Ariel Sharon, the Israeli prime minister, and a Palestinian boy throwing a stone make up a literal optimal innovation, inviting an association between a salient response (the actress's name) and a qualitatively different response relating the Israeli prime minister to the second Palestinian uprising in the occupied territories (titled *Intifada II,* or *al Aqsa Intifada*. (On the literal and nonliteral relations in pictures, see Teng & Sun, 2002.) Along the same lines, the stimulus *"Her wedding ring is a 'sorry we're closed' sign"* conveys a novel metaphoric meaning (nonreceptiveness to courtship). This, however, involves salient literal meanings that get activated automatically (Pexman, Ferretti, & Katz, 2000; see also Brisard, Frisson, & Sandra, 2001; Giora & Fein, 1999). A novel irony such as *"Read my lipstick"* is optimally innovative too. Though allowing for a new meaning to emerge, ridiculing the speaker on account of her femininity, it still invokes the salient (suspicion/lie) meaning of the familiar irony *Read my lips*. Jokes such as *How do you get holy water? Boil the hell out of it* are also optimally innovative. They are also instances of novelty that reside in salience. They invoke the salient (curse) yet alert the addressee to a possible less salient but appropriate interpretation that could have been perceived but didn't come to mind immediately. It is not a sheer surprise, then, that is pleasing, but a somewhat novel response assignable to or involving a salient, altogether different response that is gratifying(see also Giora, 1991).

Although the definition of optimal innovation (2) does not specify which of the factors (salience or novelty) features more dominantly, it nonetheless views novelty as constrained by salience; it is salience, then, that tinges novelty. The Optimal Innovation Hypothesis would, therefore, predict that stimuli involving a salient response would be more pleasurable than those that do not.

The Optimal Innovation Hypothesis is partially associated with a number of models of liking and preference (for a review, see Berlyne, 1971). For instance, on the assumption that novelty induces arousal, the model assuming a link between degree of arousal and gratification (the arousal model) would share some predictions with the Optimal Innovation Hypothesis. According to the arousal model, moderately high arousal results in the highest pleasure. Any increase or

[2]We thank Christopher Johnson (July 26, 2003) for this example.

decrease in arousal results in decline in liking (Wundt, 1874). Illustrating the process graphically, the Wundt curve "shows what can be expected to happen as arousal potential is increased from zero … As arousal potential rises above the absolute threshold, the stimulus becomes more and more pleasant and rewarding, with positive hedonic value reaching a peak when arousal potential is at a moderately high point. Further increase causes decline in positive hedonic value toward indifference … and then the stimulus becomes increasingly unpleasant and punishing with a gradual leveling off" (Berlyne, 1971, p. 90). "With regard to repeated presentation," though, "the curve is best read from right to left" (Berlyne, 1971, p. 193). Thus when a stimulus appears for the first time, it has maximum novelty and maximum arousal potential. However, with repeated exposure, it represents less and less arousal potential because repeated presentation diminishes novelty. We should thus expect a stimulus that is highly novel to be judged as unpleasant. Repetition should make it progressively less unpleasant and finally more and more pleasant until, after reaching a peak of pleasantness, it should induce indifference. This view also coincides with McClelland and others'(1953) hypothesis that stimuli differing slightly from the adaptation level of the organism will induce positive affect and will be preferred over those that digress significantly.

Indeed, the Optimal Innovation Hypothesis seems to give rise to predictions similar to those of the arousal model. It seems particularly akin to the view that a (novel) stimulus causing a "moderately high" arousal would be most pleasing, whereas lowest in likeability would be the highly innovative stimulus. However, because, unlike the arousal model, the Optimal Innovation Hypothesis also attributes to the salient a role in the pleasure induced by the optimal novelty, it would also predict a relatively high hedonic value to the highly familiar stimulus, whose arousal levels must be low and hence less pleasing or inducing indifference on the arousal model. Additionally, because unfamiliar metaphors also involve a salient response, they would be of a high hedonic value on the Optimal Innovation account. However, on the arousal model, novel metaphors should be less pleasing because their arousal levels must be high.

Other models, emphasizing the role of the familiar, also make similar predictions to those of the arousal model. For instance, the mere-exposure-effect view (see Bornstein & D'Agostino, 1992; Harrison, 1977; Kunst-Wilson & Zajonc, 1980; Maslow, 1937; Zajonc, 1968, 1980, 2000) predicts that liking of a novel stimulus would increase with repeated exposure up to a peak following which a reduction in pleasure is anticipated, resulting in boredom. Thus both the arousal and the-effect-of-mere-exposure views predict no pleasure effects but rather indifference or boredom when it comes to highly familiar stimuli. Such effects are not anticipated by the Optimal Innovation Hypothesis. In addition, both views predict no pleasure effects when it comes to unfamiliar stimuli such as novel metaphors, which does not follow from the Optimal Innovation Hypothesis.

The Optimal Innovation Hypothesis is most similar to the view proposed by Russian formalists (e.g., Shklovsky, 1917/1965) and Prague linguists (e.g., Mukařovský, 1932/1964, 1978) regarding dishabituation and deautomatization of ordinary routines in poetic discourse (for a review, see Miall & Kuiken, 1994; Renan, 1984; for a similar view, see Berlyne, 1960; Schopenhauer, 1969/1997; Townsend, 1997). To date, this dishabituation mechanism has been considered the defining feature of art and literary or poetic language. For instance, defamiliarizing salient meanings and conventions has been viewed as an attention-getting device resulting in novel, aesthetic insights (Jakobson, 1960; Lakoff & Turner, 1989, p. 215). More recently, Lakoff and Johnson (1980) and Gibbs (1994) have shed light on the ubiquity of the poetics of everyday language as well. Indeed, the Optimal Innovation Hypothesis transcends the boundaries of nonliteral, literary, or poetic mode of communication and is applicable to any kind of novel response that allows for the recoverability of a salient response. Optimal innovations can thus be viewed as "estranging" (*ostranenie* in Russian) or "foregrounding" (Miall & Kuiken, 1994) salient entrenched responses that are retrieved automatically, regardless of genre or mode of communication.

TESTING THE OPTIMAL INNOVATION HYPOTHESIS

Conducting six experiments, involving Hebrew native speakers, we examined aspects of the Optimal Innovation Hypothesis and their relevance to verbal and nonverbal stimuli. In Experiment 1 we tested the relation between the amount of linguistic innovativeness and liking by obtaining subjects' ratings of familiarity and pleasure (see also Giora, Kronrod, Elntan, & Fein, 2001; Kronrod, 2001; Kronrod, Giora, & Fein, 2000).

EXPERIMENT 1

Experiment 1 aims to show that it is optimal innovation (5) that is most pleasing—more pleasurable than either the familiar which it provokes (3) or its variant version (4)—which involves no sufficient novelty, or a pure innovation that has been created by introducing at least 2 modifications into the familiar, so that the familiar may be difficult to retrieve (6):

(3) Body and soul (familiar expression)
(4) Bodies and souls (variant version)
(5) Body and sole (optimal innovation)
(6) Bobby and Saul (pure innovation)

Method

Participants. Eighty students from Tel Aviv University (50 women and 30 men) aged 19–35 served as volunteer subjects. Most of them were approached at the university library. They were divided randomly into four groups of 20 each.

Materials. Thirty familiar expressions (such as 3) were subjected to manipulations that resulted in three types of innovative variations (such as 4–6). The first variation (4) was made up by introducing a minor alteration that resulted in no change of meaning so that no novel response was expected. The second variation (5) was made up by introducing an alteration that should affect some novel response but such that would not block salient responses. The third variation (6) involved at least two alterations. Although they preserved the rhythm and form of the original, they were intended to induce a novel response but such that would not allow for the recognition of a salient response. In all there were 120 items.

To validate the intended hierarchy, we ran a norming study, in which we presented these items to 10 high-tech participants (7 women and 3 men, aged 24–32) who were asked to rate each variation (4–6) in terms of how similar it was to the original (3). A 7-point similarity scale was used, in which 7 = *highly similar* and 1 = *least similar*). The variations were presented in random order.

As shown in Table 1, results confirmed the assumed hierarchy. Two one-way ANOVAs for subjects (F_s) and items (F_i) revealed a significant difference between the variations, $F_s(2,18) = 536.43$, $p < .001$, $F_i(2,58) = 1315.82$, $p < .001$. The linear contrast (1,0,–1) was significant, too, suggesting a gradual growing difference between the variations in relation to the original, $F_s(1,9) = 1110.83$, $p < .001$, $F_i(1,29) = 3930.32$, $p < .001$, with the variant variation being most similar and the highly innovative variation being least similar.

Even though this pretest substantiated the intended quantitative differences between the items, it was still necessary to ascertain that the assumed optimal innovation would be also qualitatively distinguished from the salient response (as required by 2a) as would the assumed pure innovation but not the variant version. To do that, we ran another pretest. This time 36 graduate students from Tel Aviv University, (28 women and 8 men, aged 21–28) were asked to indicate whether each

TABLE 1
The Similarity Relation Between the Different Variations and the Original (Experiment 1)

Variation Type	*M*	*SD*
Variant version	5.98	0.36
Optimal innovation	3.76	0.25
Pure innovation	1.41	0.18

variation (4–6) was either *different* or *not different* in meaning from the original (3). As earlier, the variations were presented in random order.

Averaging across items, most of the subjects indicated that the assumed optimal innovations, as well as pure innovations (95% and 97% respectively), were indeed different in meaning from the original. However, as anticipated, only 23% of the participants indicated that the assumed variant items were different from the familiar original. These results ascertain that the gradual increase in quantitative deviation from the original has a cut-off point above which items, including the optimal innovation, are considered qualitatively different from the original.

Having been validated, these 120 items were now divided into four booklets, each containing only one version of the quartets 3–6. Each booklet included 30 items presented twice. One part of the questionnaire constituted a familiarity test; the other part was a liking/pleasure test in which the same items were presented in a different order.

Procedure. In the first part of the experimental questionnaire, participants were asked to rate the familiarity of each item on a 7-point familiarity scale, in which 7 = *highly familiar* and 1 = *entirely unfamiliar.* In the second part, the instruction was to rate the pleasurability of each item on a 7-point liking/pleasurability scale, in which 7 = *highly pleasurable* and 1 = *least pleasurable*.

Results and Discussion

Familiarity ratings. Findings of familiarity ratings are presented in Table 2 and Figure 1. Two one-way ANOVAs for subjects (F_s) and items (F_i) revealed a significant effect of version type on familiarity, $F_s(3,237) = 772.02$, $p < .001$, $F_i(3,87) = 467.84$, $p < .001$. A planned linear contrast (–3,–1,1,3) of the familiarity ratings (2.02, 4.04, 5.52, 6.79) was found to be significant, $F_s(1,79) = 2771.56$, $p < .001$, $F_i(1,29) = 1630.98$, $p < .001$, demonstrating that the variations differed significantly on the familiarity scale with the original expression being most familiar, the variant version ranking second in familiarity, followed by the variation to be termed optimally innovative. Least familiar was the variation involving two modifications.

Pleasure ratings. Findings of pleasure ratings are also presented in Table 2 and Figure 1. Two one-way ANOVAs for subjects (F_s) and items (F_i) revealed a significant effect of version type on pleasure, $F_s(3,237) = 86.89$, $p < .001$, $F_i(3,87) = 37.22$, $p < .001$. A planned contrast (1,–1, 2, –2) of the pleasure ratings (3.79, 3.42, 5.31, 2.56) was found to be significant, $F_s(1,79) = 213.18$, $p < .001$, $F_i(1,29) = 62.87$, $p < .001$, demonstrating that, as expected, the variations differed significantly in degree of pleasure, with the optimally innovative variation scoring highest on the pleasurability scale, followed by the most familiar expression. Least pleasing was the least familiar variation.

TABLE 2
Familiarity and Pleasure Ratings (Experiment 1)

	Familiar Expression		*Variant Version*		*Optimal Innovation*		*Pure Innovation*	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Familiarity	6.79	0.33	5.52	0.79	4.04	1.26	2.02	0.69
Pleasure	3.79	1.56	3.42	1.28	5.31	1.49	2.56	0.99

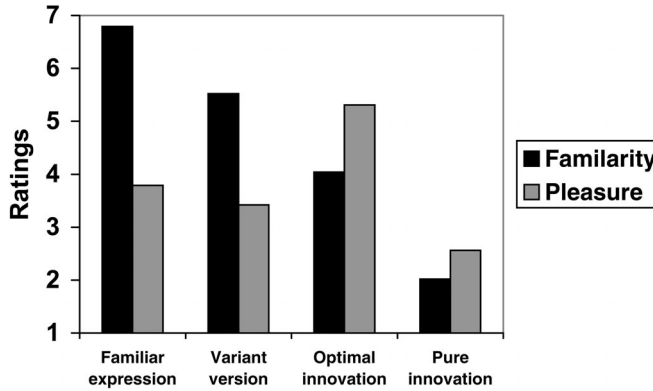

FIGURE 1 Familiarity and pleasure ratings (Experiment 1).

Results of Experiment 1 thus lend support to the Optimal Innovation Hypothesis according to which items involving both a salient and a novel response should be rated as more pleasurable than those that do not. They show that optimal innovation—innovation occupying mid position on the familiarity scale allowing for both the salient and the innovative to be induced—is most pleasing. In contrast, pure innovation—innovation that does not allow for the recoverability of salient responses—is least pleasing. The view that it is recognizing the salient in the novel that accounts for pleasure ratings gains further support from the relatively high pleasure ratings of familiar and less familiar stimuli. Even though the most familiar (3) is highly pleasurable (though not most pleasurable), the highly innovative (6) is hardly pleasing. The less familiar variant version occupies mid position on the pleasurability scale between the familiar and the least familiar. In contrast to earlier accounts (Berlyne, 1971; Bornstein & D'Agostino, 1992; Harrison, 1977; Kunst-Wilson & Zajonc, 1980; Wundt, 1874; Zajonc, 1968, 1980, 2000), the highly familiar, which according to these views should have been rated as boring, is highly pleasing, whereas the slightly less familiar, which, according to these models should have been more pleasing, is actually pleasing to a lesser extent. In

sum, it is not the most familiar that is least enjoyable but rather the most novel that is least pleasing. Pleasure, however, is a function of both salience and novelty.

EXPERIMENT 2

Although Experiment 1 showed that most pleasing would be an innovation that occupies mid position on the familiarity scale, it could be argued that we haven't, in fact, demonstrated that stimuli rated most pleasurable (5) were indeed optimally innovative in the sense that they actually involved processing the familiar stimuli from which they derive (2b). Experiment 2 was, therefore, designed to tap salient meanings online. Using reading times, we aimed to show that familiar stimuli (3) would take less time to read, following the most pleasurable optimal innovation (5) than following the least pleasurable pure innovation (6). Such findings would demonstrate that only the optimally innovative stimuli prime the salient responses, thus meeting the requirement in 2b, whereas the least pleasurable innovations do not.

Method

Participants. Forty high-tech staff (15 women and 25 men) aged 21–35 (mean, 27.3 years) served as volunteer subjects.

Materials. Twenty familiar expressions (3) used in Experiment 1 served as target sentences. They were either preceded by an optimally innovative sentence context (5) or by a pure innovation context (6). Ten filler pairs were prepared, comprising somewhat provocative texts (such as *The explosion was quick and brusque, just leaving behind a lot of mess*) aimed to keep the subjects alert to the experimental materials.

Procedure. A visual basic software was prepared and installed onto a mobile computer. The experiment was conducted individually for each participant and was preceded by a pretest aiming to establish the natural reading pace of each participant. In the pretest participants read sentences resembling the experimental sentences in their syntactic structure and syllable length. The reading times obtained for these sentences served as the display time of the equivalent context sentences. Participants were asked to read the pairs of sentences displayed and press the bar key when they had read the second (target) sentence. Reading times of the target sentences were recorded by the computer.

Results and Discussion

Reading times in each condition were averaged and compared, using both subjects and items *t* tests. As predicted, reading times of familiar targets following the optimally innovative contexts (1.12 sec, $SD = 0.41$) were significantly shorter than reading times of the same sentences following the pure innovation contexts, (1.21 sec, $SD = 0.44$), $t_s(1,39) = 4.69$, $p < .001$, $t_i(1,19) = 3.18$, $p < .005$. These results demonstrate that the optimally innovative contexts primed the targets, whereas the pure innovations did not. Optimal innovations have thus been shown to involve processing the familiar stimuli from which they derive and which provided for the source of the priming effects.

EXPERIMENT 3

To control for the possibility that the results in Experiments 1 and 2 were a function of the different targets used, we designed Experiment 3. In this experiment we used the same targets whose salient and less salient innovative meanings are invited by different (late) contexts (7a and 7b, respectively). If targets (7) are more pleasurable in a context that invites their less salient innovative interpretation (7b) than in a context that invites their salient idiomatic interpretation (7a), this will support the Optimal Innovation Hypothesis (see Elnatan, 2002):

(7) You don't know your right from left?
  a. *The Comprehensive Lexicon* will teach you whatever you don't know.
  b. Buy *The Comprehensive Guide for the Political Factions in Israel*.

Method

Participants. Forty students from Tel Aviv University aged 22–35 served as volunteer subjects.

Materials. Twenty familiar idiomatic expressions (7) were selected on the basis of a familiarity pretest and provided for the experimental materials. This pretest involved 20 students from Tel Aviv University (17 women and 3 men aged 24–35) who were asked to write down the meaning of each of the 20 experimental items. Results ascertained that the assumed salient interpretations were all familiar to all the participants. The less or nonsalient meanings did not feature at all.

Two booklets were prepared, each containing 20 familiar expressions (7). Ten expressions were followed by a late context that invited their salient meaning (7a), and 10 were followed by a context that invited their less salient innovative interpretation (7b). The booklets were mirror images of each other so that an item that was

followed by a context compatible with its salient meaning in one booklet received an optimally innovative biasing context in the other.

Procedure. Subjects were divided into two groups of 20 each. Each group received only one type of booklet. They were asked to rate the pleasurability of each target (7) in the given contexts on a 7-point liking/pleasurability scale, in which 7 = *highly pleasurable* and 1 = *least pleasurable*.

Results and Discussion

Results of two participants (5%), who rated all the items equally pleasing, were omitted from the analysis. Pleasure ratings in each condition were averaged and compared, using *t* tests for subject (t_s) and item (t_i) analyses. Findings lend support to the Optimal Innovation Hypothesis. They show that, as predicted, pleasure ratings of items followed by a context inviting an optimally innovative interpretation (4.74; $SD = 0.86$) were significantly higher than those followed by a context inviting a salient interpretation, (3.47; $SD = 1.05$), $t_s(37) = 10.77$, $p < .0001$; $t_i(19) = 11.35$, $p < .0001$.

EXPERIMENT 4

The assumption of Experiment 3 was that the higher pleasure ratings obtained for items in a context inviting their innovative meaning compared to a context inviting their more salient meaning was a result of the former being optimally innovative. Recall that optimally innovative items are such that involve a novel response, which also allows for a salient response to get through (cf. 2). Thus if the higher pleasure ratings were indeed a result of optimal innovativeness, these items should take longer to read in a context inviting their less salient optimally innovative interpretation than in a context inviting their more salient familiar interpretation. Experiment 4 was designed to test this prediction and thereby lend further support to the Optimal Innovation Hypothesis (cf. 1).

As in Experiment 3, in this experiment materials involved familiar idiomatic stimuli placed in discourse initial position followed by a context so that processing them would initially involve processing their salient (idiomatic) meaning. However, when their late context invites their less salient optimally innovative meaning, these items would involve reinterpretation of the meaning activated initially. Such stimuli presentation then guarantees that both the salient and innovative meanings would be involved in processing the text as a whole.

Given that these items were displayed in discourse initial position followed by a late context (see Experiment 3), measuring their reading times would not reflect the differences anticipated when they are placed following a context. Therefore,

we treated them as contexts and measured reading times of the targets that followed them, which either required their optimally innovative reinterpretation ("You don't know your right from left? Buy *The Comprehensive Guide for the Political Factions in Israel*") or did not ("If you want to familiarize yourself with the political situation in Israel, buy *The Comprehensive Guide for the Political Factions in Israel*").

Reading times of targets ("Buy *The Comprehensive Guide for the Political Factions in Israel*") following contexts that would have to be reinterpreted as a result ("You don't know your right from left?") would take longer to read than targets that do not affect such reinterpretation (see Gibbs, 1980). In contrast, however, the Optimal Innovation Hypothesis would predict that, taken together with their contexts, such items would be rated as more pleasing than their noninnovative counterpart. The Optimal Innovation Hypothesis further predicts that even if they take longer to read than irrelevant controls, their texts would be rated as more pleasing than those involving unrelated controls because only they meet the requirement for optimal innovativeness. Using controls in this experiment was actually aimed to reduce the possibility that lengthy reading times of optimal innovations might reflect lack of understanding, which would make optimal innovations comparable to incomprehensible texts. However, if these demanding novel texts are rated as more pleasurable than the unrelated controls, this should indicate that their lengthy reading times reflect the extra processing induced by reinterpretation than by incomprehensibility (see also Giora et al., 2001; Elnatan, 2002).

Method

Participants. Thirty graduate students (20 women and 10 men) aged 25–35 served as volunteer subjects.

Materials. Thirty sentences served as targets (8d). Preceded by three different types of contexts (8a-c), they made up 90 experimental discourses (8a/d; 8b/d; 8c/d). One set of context sentences comprised 30 familiar idiomatic fixed expressions (8a) (20 of which were used in Experiment 3; the additional 10 expressions had been subjected to the same familiarity pretest as in Experiment 3). This set would be compatible with the target sentence only if reinterpreted along its optimally innovative meaning. Another set comprised 30 context expressions (8b) that required no reinterpretation to fit in with the target. The third set of 30 items (8c) would, under no circumstances, be coherent with the target sentence and served as irrelevant controls:

(8) a. You don't know your right from left?
b. If you want to familiarize yourself with the political situation in Israel,

c. If you are the type that sings in the shower,
d. Buy *The Comprehensive Guide for the Political Factions in Israel*.

Procedure. A visual basic software was prepared and installed onto a mobile computer. The experiment was conducted individually for each participant. The participants were told they would have to read pairs of sentences and rate them on a 7-point liking/pleasurability scale, in which 7 = *highly pleasurable* and 1 = *least pleasurable*. Participants made up three groups. Each group saw 30 different pairs presented randomly: 10 of the (8a/d) type, 10 of the (8b/d) type, and 10 of the (8c/d) type. They were asked to read the sentences and press the "enter" key when they had read each sentence. Reading times of the target sentences (8d) were measured from onset until the pressing of the "enter" key. Pressing the "enter" key following the target sentence advanced the pleasurability scale. At that point participants had to rate the pleasurability of the whole set (a two-sentence text). After the liking rating was keyed in, the next context sentence was displayed. A training session preceded the experiment in which participants were presented hard copies of sample items, which they had to read and rate for pleasurability. In addition, four buffer pairs preceded the actual experiment.

Results and Discussion

Reading times. The median reading time in each condition served as the basic datum for both subject (t_s) and item (t_i) *t* tests. As predicted, reading times of targets (8d) preceded by contexts inviting an optimally innovative interpretation (8a) were significantly longer (2.89 sec, $SD = 1.70$) than reading times of the same sentences preceded by contexts inviting their salient interpretation (8b), (2.51 sec, $SD = .48$), $t_s(29) = 2.79$, $p < .005$; $t_i(29) = 2.74$, $p < .01$, and shorter than when preceded by controls (8c), (3.11 sec, $SD = 62$), $t_s(29) = 1.46$, $p = .08$; $t_i(29) = 2.49$, $p < .01$. When preceded by contexts inviting a salient interpretation (8b), reading times of targets (8d) were significantly shorter than when preceded by controls, $t_s(29) = 5.98$, $p < .0001$; $t_i(29) = 6.03$, $p < .0001$ (see Figure 2).

Pleasure ratings. Pleasure ratings in each condition were averaged and compared, using *t* tests for subject (t_s) and item (t_i) analyses. As predicted, pleasure ratings of texts involving a context sentence to be reinterpreted as optimally innovative (8a/d) were rated as most pleasing. They were significantly more likable (4.09, $SD = .94$) than texts involving a context sentence that did not require such a reinterpretation of its salient meaning (8b/d), (2.77, $SD = .91$), $t_s(29) = 6.89$, $p < .001$; $t_i(29) = 8.04$, $p < .001$, and more pleasurable than texts involving an irrelevant control context (8c/d), (1.57, $SD = .38$), $t_s(29) = 13.78$, $p < .0001$; $t_i(29) = 15.26$, $p < .0001$. Ratings of texts involving salient contexts (8b/d) were signifi-

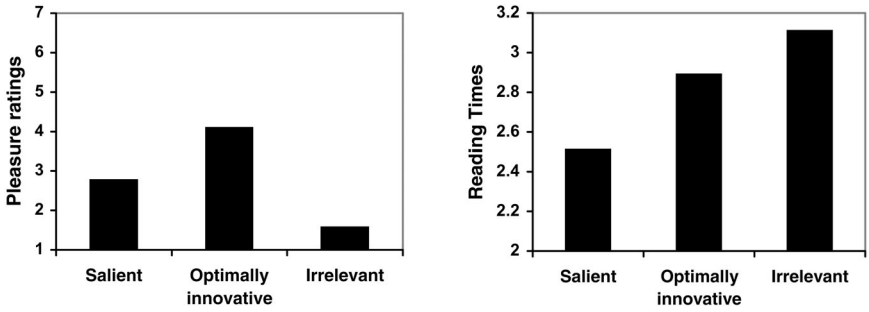

FIGURE 2 Pleasure ratings (left panel) and reading times (in sec, right panel) of stimuli followed by different contexts (Experiment 4).

cantly higher than those involving irrelevant controls (8c/d), $t_s(29) = 7.43$, $p < .001$; $t_i(29) = 11.14$, $p < .001$ (Figure 2).

Results from reading times and pleasure ratings, then, support the Optimal Innovation Hypothesis. They show that items interpreted as optimally innovative—involving both salient and novel responses, thereby requiring extra processing time—are rated as most pleasurable. Their high pleasurability compared to the unpleasant incoherent controls argues against the possibility that their lengthy processing is a function of incomprehensibility.

Although most of the items used here were figurative (familiar idioms), whose literal rather than metaphoric interpretations met the optimal innovation requirements (2), we have not quite controlled for the figurativeness variable. In the following experiment we, therefore, attempt to show that it is optimal innovation rather than figurativeness that accounts for aesthetic effects.

EXPERIMENT 5

According to Optimal Innovation Hypothesis (1) it is not figurativeness per se that should be perceived as likable. Rather, (a) it is novel metaphors that would be rated as pleasing, more pleasing than their more familiar literal interpretations. In contrast, (b) familiar metaphors that do not differ in familiarity from their literal interpretations would not differ from them in likeability. More important, (c) highly familiar metaphors, whose metaphoric meaning is highly salient, would be rated as less pleasing than their less salient literal interpretations.

In an earlier study (Giora, Kotler, & Shuval, in press), we tested the first two predictions. We showed that familiar metaphors and their familiar literal interpretations, which took equally long to read (see Giora & Fein, 1999) scored similarly on the pleasurability scale due to their similar salience. In contrast, novel meta-

phors, which took longer to read than their literal interpretation (see Giora & Fein, 1999), scored higher on the pleasurability scale compared to their literal interpretations, which involved no novelty. Such results support the Optimal Innovation Hypothesis. They show that it is neither literality nor figurativity that accounts for pleasure ratings. Instead, it is optimal novelty that induces aesthetic judgments.

To further support our claim that it is optimal innovation rather than figurativeness that accounts for pleasure effects, the third prediction needs to be tested. The purpose of Experiment 5 was, therefore, to show that the literal interpretation of highly familiar metaphors would be rated as more pleasing than their more familiar metaphoric interpretation. To do that, we now selected more highly familiar metaphors than those tested in Giora et al. (in press). Given that for these items, it is the literal interpretation that meets the optimal innovation requirements (2), promoting a less salient (literal) interpretation while activating the salient (metaphoric) one, we expected these highly familiar utterances to be more likable when interpreted literally than when interpreted metaphorically. In addition, we also aimed to replicate our earlier findings (Giora et al., in press), demonstrating that novel metaphors would be rated as more pleasurable than their more familiar literal interpretation. According to the Optimal Innovation Hypothesis, then, it is the metaphoric meaning of novel metaphors that would yield higher pleasure ratings compared to their literal interpretation. By contrast, it is the literal interpretation of highly familiar metaphors that would yield higher pleasure ratings compared to their metaphoric interpretation.

To compile the set of experimental targets, we collected familiarity ratings for 200 items presented as metaphoric, all of which, however, also made perfect sense when interpreted literally. Thirty-two mathematics and chemistry students from Tel Aviv University (18 women and 14 men) aged 22–35 were asked to rate their experiential familiarity with these items on a 7-point scale of familiarity, in which 7 = *highly familiar* and 1 = *entirely unfamiliar.* In addition, they were asked to write down a sentence explicating the meaning of each of these expressions.

Results yielded 20 highly familiar metaphors scoring 6.44–6.93 on the familiarity scale and 20 highly novel metaphors scoring 1.03–1.97 on this scale. Fleshing out the meanings of these items made sure that the metaphors rated as familiar indeed achieved agreement on the salient metaphoric meanings as assumed, whereas the novel metaphors did not. These items also served as the materials for the second pretest.

In the second pretest, we aimed to establish the set of optimally innovative items, items involving two qualitatively different responses (2). To do that, we embedded 20 items of the previous pretest scoring highest on the familiarity scale (highly familiar metaphors) and 20 items scoring lowest on that scale (novel metaphors) in literally and metaphorically biasing contexts. The assumption was that, in a literally biasing context, highly familiar utterances would involve both their less salient contextually appropriate literal meaning as well as their salient but in-

appropriate metaphoric meaning; in the metaphorically biasing context, novel metaphors would involve their nonsalient but appropriate metaphoric interpretation as well as their more salient but inappropriate literal interpretation. Having distinctly different novel and salient interpretations should render these items optimally innovative and, consequently, less coherent with their prior context compared to salient meanings. Because optimal innovations involve salient but contextually inappropriate meanings on top of their novel but contextually appropriate meanings, they should not cohere with prior context as smoothly as would contextually appropriate salient meanings.

Participants in this study were 60 communication students from Tel Aviv University (40 women and 20 men) aged 20–35. They were presented 20 highly familiar metaphors such as *"big eyes"* and 20 unfamiliar novel metaphors such as *"a geometrical abstract painting,"* which were now embedded at the end of context texts. One type of context biased the targets toward their figurative interpretation (9a, 10a); another type of context biased them toward their literal interpretation (9b, 10b). In all, there were 80 targets embedded at the end of context texts. Two booklets were prepared each containing 40 experimental items and 10 filler items so that each participant saw only one version of each target. Order of presentation was random.

Novel items

(9) a. Context supporting figurative meaning:
Sharon went to sleep very late. In the morning she was supposed to have a very important meeting. At a certain point she almost thought about canceling it because she hates waking up in the morning, looking in the mirror, and seeing a geometrical abstract painting.
b. Context supporting literal meaning:
Sharon finished renovating her house. She put a lot of thought into designing the different rooms. She says she's very pleased, but the only thing that is still missing for the living room to look perfect is a geometrical abstract painting.

Highly familiar items

(10) a. Context supporting figurative meaning:
Alon and Rany went to a restaurant. They ordered several appetizers, several main dishes, and a number of deserts. Although they were still through their first course, Alon already announced that he was completely full. "It's amazing", said Rany "how I keep forgetting that you have such *big eyes*."
b. Context supporting the literal meaning:
In his paper "The evolution of Mickey Mouse," Stephen Jay Gould argued that there are many physiological features that make us perceive cubs as

cute, such as their head being big compared to the size of their body and the fact that they have relatively *big eyes*.

Participants were asked to rate on a 7-point naturally fitting scale, in which 7 = *highly fitting* and 1 = *entirely unfitting with prior context*, the extent to which each target was appropriate in or naturally fitting with its given context.

Results from two participants (3.3%) were discarded because they rated all the items as equally appropriate. In all, as predicted, utterances whose salient meanings were supported by their context were found to score higher on the goodness of fitting scale than items whose nonsalient interpretations were invited (see Figures 3 & 4).

Novel metaphors. With regard to unfamiliar novel items, results obtained from subject (t_s) and item (t_i) analyses showed that the relatively salient literal interpretation of novel metaphors (based on the salient meaning of the utterances' components), scoring 5.77 ($SD = 0.74$) on the appropriateness scale, was rated as more fitting with prior context than the nonsalient metaphoric interpretation scoring, 3.78 ($SD = 1.21$), ($t_s(57) = 15.60$, $p < .0001$, $t_i(19) = -7.37$, $p < .0001$).

Highly familiar metaphors. In contrast, the salient metaphoric meaning of familiar metaphors, scoring 5.86 ($SD = 0.80$) on the coherence scale, was rated as

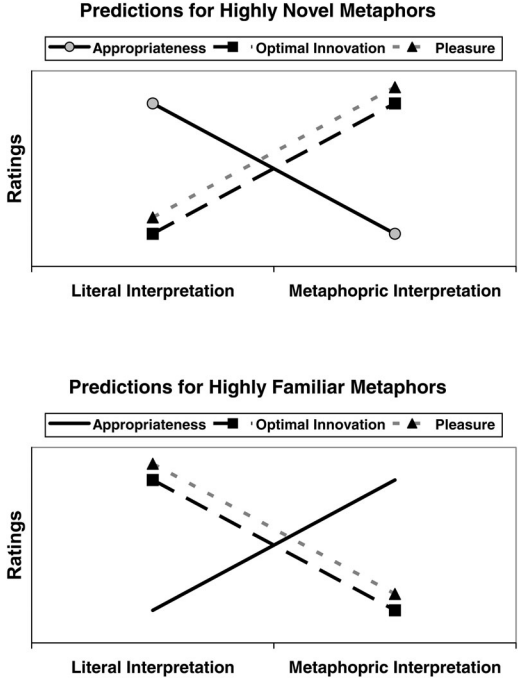

FIGURE 3 Predictions for highly novel and highly familiar items (Experiment 5).

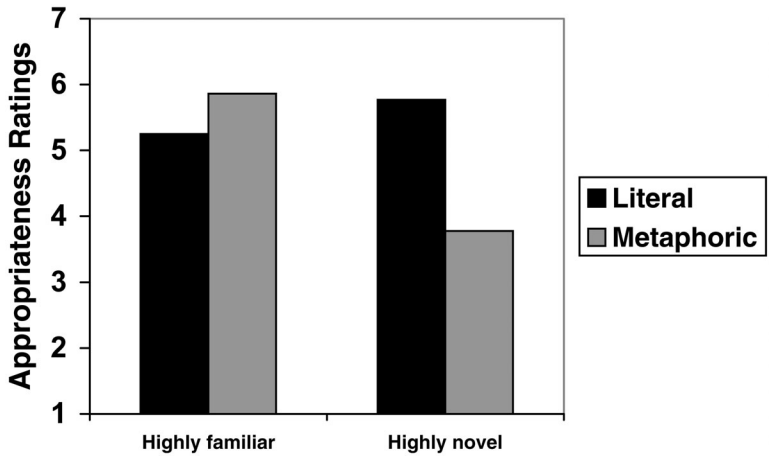

FIGURE 4 Appropriateness ratings (Experiment 5).

more fitting with prior context than the less salient literal interpretation of these metaphors, scoring 5.25 ($SD = 0.96$), ($t_s(57) = 5.31, p < .0001, t_i(19) = 2.42., p < .05$).

In all, these results detect optimal innovations. They establish that, as assumed, the metaphoric meanings of novel metaphors and the literal interpretation of highly familiar metaphors are optimal innovations. They were rated as less fitting with prior context than their more salient counterparts (the metaphoric meanings of familiar metaphors; the literal interpretation of novel metaphors). When familiar metaphors were interpreted literally, the low coherence of their literal interpretations reflects the involvement of their nonfitting but salient metaphoric meaning. When novel metaphors were intended metaphorically, their low coherence reflects the involvement of their nonfitting but more salient literal interpretation (on the automatic activation of the salient response, see Giora, 2003; on the involvement of the salient response in metaphor comprehension, see Giora & Fein, 1999).

In the third, main study of Experiment 5, pleasure ratings of the targets in their respective contexts were collected. The aim here was to show that, regardless of figurativity, items meeting the optimal innovation requirements (metaphoric interpretations of novel metaphors and literal interpretations of highly familiar metaphors) would be rated as more pleasing than their counterparts that do not (metaphoric interpretations of familiar metaphors and literal interpretations of novel metaphors; for illustration of the various predictions, see Figure 3).

Method

Participants. Sixty first-year linguistics students from Tel Aviv University (35 women and 25 men aged 20–30) served as volunteer subjects.

Materials. Materials as in the previous pretest.

Procedure. Participants were asked to rate the extent to which each target sentence, embedded in its respective context, was pleasing on a 7-point pleasurability scale, in which 7 = *highly pleasurable* and 1 = *does not induce pleasure*.

Results and Discussion

Results from six participants (10%) were discarded because they did not complete the questionnaire. In all, our predictions were confirmed only with regard to novel metaphors and their more familiar literal interpretations. Results obtained from subject (t_s) and item (t_i) analyses showed that the nonsalient metaphoric interpretation of novel metaphors, scoring 4.02 (SD = 1.00) on the pleasurability scale, was rated as more pleasing than the relatively salient literal interpretation, scoring 3.53 (SD = 1.12) on that scale ($t_s(53) = 2.65$, $p < .01$, $t_i(19) = 3.76$, $p < .001$). Although the differences between the familiar metaphors, scoring 3.64 (SD = 1.31) on the pleasurability scale and their literal interpretations, scoring 3.78 (SD = 0.93) on that scale were in the right direction, they did not reach significance.

To see if, when salience imbalance is polarized, the tendency noted would reach significance, we selected the 10 most highly familiar metaphors (scoring 6.71–6.93 on the familiarity scale) and the 10 most highly novel items (scoring 1.03–1.62 on that scale) and compared their pleasurability ratings. Indeed, as illustrated by Figure 5, testing the most highly familiar and the most highly novel items

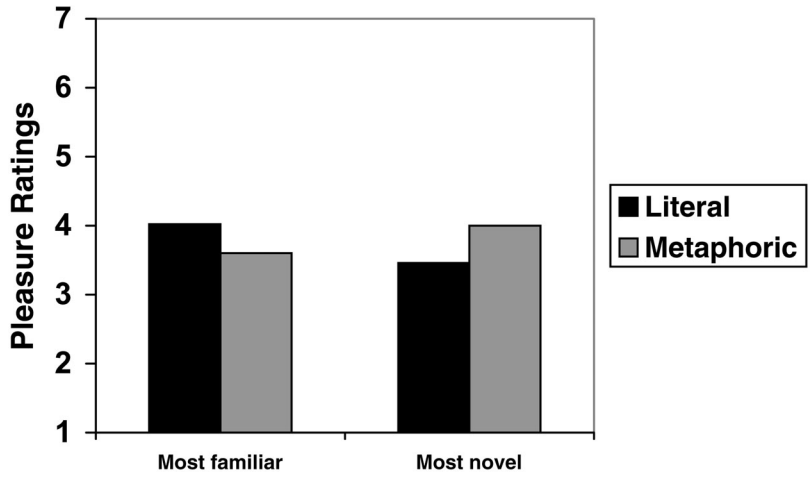

FIGURE 5 Pleasure ratings (Experiment 5).

resulted in the anticipated pleasure ratings differences. With regard to the most highly novel metaphors, results obtained from subject (t_s) and item (t_i) analyses showed that the nonsalient, metaphoric interpretation of novel metaphors, scoring 4.00 (*SD* = 1.13) on the pleasurability scale, was rated as more pleasing than the relatively salient, literal interpretation, scoring 3.46 (*SD* = 1.35) on that scale ($t_s(53) = 2.31$, $p < .05$, $t_i(9)=2.35$, $p < .05$). Similarly, the differences between the most highly familiar metaphors scoring 3.60 (*SD* =1.34) on the pleasurability scale and their literal interpretations scoring 4.02 (*SD* = 1.08) on that scale was significant ($t_s(53) = 2.31$, $p < .05$, $t_i(9) = 2.35$, $p < .05$), suggesting that their more innovative interpretations were considered more pleasing.

Taken together, the results from Giora et al. (in press) and those obtained here support the claim that it is neither literality nor figurativity that can explain pleasure ratings, but optimal innovation. In Giora et al. (in press), items sharing similar salience (familiar metaphors and their literal interpretations) induced similar pleasure ratings; items diverging in salience (novel metaphors and their literal interpretations) induced different pleasure ratings. Similarly, here, items diverging in salience—highly novel metaphors and their more salient literal interpretations; most highly familiar metaphors and their less salient literal interpretations—induced different pleasure ratings, with optimal innovation (the metaphoric interpretation of highly novel metaphors and the literal interpretation of the most highly familiar metaphors) scoring highest on the pleasurability scale. Pleasurability, then, is sensitive to optimal innovation rather than to metaphoricity.

It is important to note that, in contrast to earlier research, we have shown here that highly novel items (highly novel metaphors), which should have been least pleasing according to earlier accounts (Berlyne, 1971; Bornstein & D'Agostino, 1992; among others), were rated high on the pleasurability scale, suggesting that, on their own, quantitative measures such as amount of familiarity or exposure cannot account for pleasure effects.

EXPERIMENT 6

So far we have tested the Optimal Innovation Hypothesis with regard to verbal stimuli. To show that the Optimal Innovation Hypothesis is of general applicability, we also tested it with regard to nonverbal items (see also Berlyne, 1971). In this experiment we aimed to show that visual stimuli (see Figure 6) that occupy mid position on the familiarity scale (Figure 6b), involving the familiar (2b) and more (2a) would be rated most pleasurable. Assuming that salience plays a crucial role in liking, least pleasurable would be stimuli rated as least familiar (Figure 6c). Mid position on the pleasurability scale would be occupied by stimuli rated as highly familiar (Figure 6a).

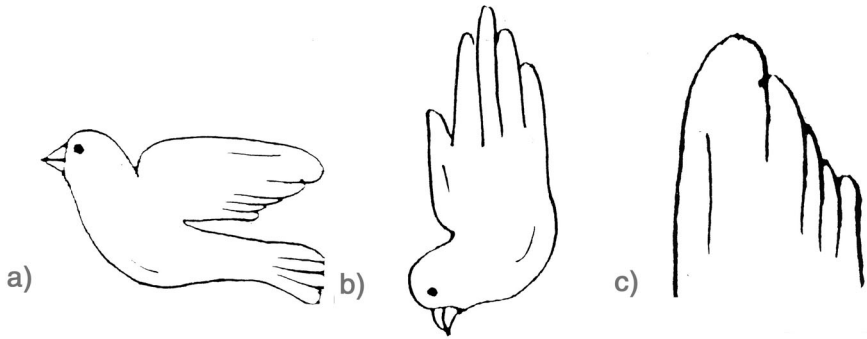

FIGURE 6 Examples of the visual stimuli used in Experiment 6. (a)Familiar stimuli; (b) Optimally innovative stimuli; (c) Purely innovative stimuli.

Experiment 6 thus aims to show that it is optimal innovation (12) that is most pleasing, more pleasurable than either the familiar stimuli from which it stems (11), or a pure innovation that has been created by introducing at least two modifications into the original, so that the original may be difficult to retrieve (13). (See also Experiment 1.)

Method

Participants. Sixty Linguistics students from Tel Aviv University aged 20–30 served as volunteer subjects.

Materials. Thirty familiar visual inputs (such as 11 portraying the familiar peace dove) and 30 apparently optimal innovations (such as 12 portraying the familiar peace dove as having a wing in the shape of a hand signaling a peaceful handshake) were collected or created. Thirty additional stimuli were prepared, introducing some alterations to the familiar input so that it would look unfamiliar and dissociated from the original from which it derived (such as 13 presenting the dove's wing from an irregular perspective). In all, there were 90 items, divided into three different booklets, each containing only one item of the triplets (11–13) so that each booklet contained 30 items: 10 supposedly familiar items, 10 supposedly optimal innovations, and 10 supposedly unfamiliar items presented in random order. All the percepts were presented in black and white to eliminate color effect, and each percept was presented on a separate page. Sixty booklets were prepared.

Procedure. Thirty participants were asked to rate the items on a 7-point familiarity scale, in which 7 = *highly familiar* and 1 = *entirely unfamiliar*, and 30

were asked to rate the pleasurability of each item on a 7-point liking/pleasurability scale, in which 7 = *highly pleasurable* and 1 = *least pleasurable*.

Results and Discussion

Familiarity ratings. The familiarity ratings were averaged and compared, using *t* tests. As anticipated, familiarity ratings of the assumed familiar items (6.53, $SD = .44$) were significantly higher than those obtained for items assumed to be unfamiliar, (2.31, $SD = .64$), $t_s(29) = 41.11$, $p < .0001$, $t_i(29) = 16.33$, $p < .0001$, and higher than those assumed to be optimally innovative, (4.17, $SD = 1.07$), $t_s(29) = 13.02$, $p < .0001$, $t_i(29) = 11.14$, $p < .0001$. Similarly, the assumed optimally innovative items were also significantly more familiar than unfamiliar items, $t_s(29) = 8.91$, $p < .0001$, $t_i(29) = 7.38$, $p < .0001$, thus establishing the assumed familiarity hierarchy (see Figure 6).

Pleasure ratings. The pleasure ratings were averaged and compared, using *t* tests. As predicted, optimally innovative items were rated as most pleasurable (3.76, $SD = 1.04$), more pleasurable than familiar items (3.23, $SD = 1.11$), $t_s(29) = 2.27$, $p < .05$, $t_i(29) = 2.49$, $p < .05$, and unfamiliar items, $t_s(29) = 5.06$, $p < .0001$, $t_i(29) = 6.15$, $p < .0001$, which were rated as least pleasing (2.68, $SD = .96$). Next in pleasurability were the familiar items, rated more pleasurable than unfamiliar ones, $t_s(29) = 2.61$, $p < .01$, $t_i(29) = 3.01$, $p < .005$, attesting to the role of familiarity in affect and appreciation (see Figure 7).

Findings from nonverbal stimuli replicate findings from verbal stimuli (Experiments 1–4). They support the view that it is neither pure innovation nor familiarity alone that accounts for highly aesthetic judgments. Rather, it is optimal innova-

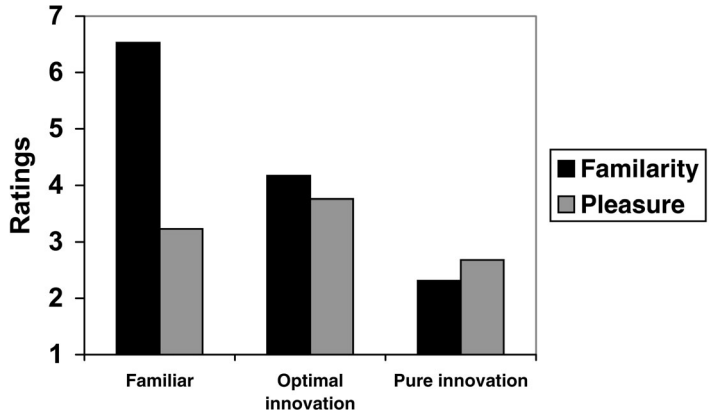

FIGURE 7 Familiarity and pleasure ratings of visual stimuli (Experiment 6).

tion—novelty that allows an insight into some salient response—that is most pleasurable. Indeed, optimal innovations are more pleasurable than familiar stimuli. Although they share similar familiar responses, they also involve unfamiliar responses. Optimal innovations are also more pleasurable than pure innovations. Although both involve novel responses, only optimal innovations further involve familiar responses. Pleasure, then, is a function of both salience and innovativeness.

GENERAL DISCUSSION

What kind of discourses would be evaluated as likable? The Optimal Innovation Hypothesis assumes that, to be rated as pleasing, a stimulus should be optimally innovative. It should involve a novel response but such that would allow for the recoverability of a salient (familiar) response from which, however, it should be qualitatively different. The Optimal Innovation Hypothesis thus predicts that optimal innovations would be rated as more pleasing than stimuli lacking in either salience or novelty (i.e., qualitatively different from the salient response).

Findings from six experiments dealing with verbal and nonverbal items support the Optimal Innovation Hypothesis. They demonstrate that, indeed, pleasure is sensitive to optimal innovativeness. Optimal innovations (*"a peace of paper"*) have been found to be more pleasing than either familiar stimuli (*a piece of paper*), variant versions (*a single piece of paper*), or pure innovations (*"a pill of pepper"*). The second most pleasing stimulus is the most familiar one. The least likable is the least familiar, attesting to the role of salience in aesthetic judgments. Salience on itself, however, will not account for all the findings.

The Optimal Innovation Hypothesis further predicts that figurativeness per se would not affect pleasure ratings. Rather, as found, it is novel metaphors that would be rated as pleasing, more pleasing than their more familiar literal interpretations, and literal interpretations of highly familiar metaphors that would be more pleasing than their less familiar counterparts (Experiment 5). In contrast, familiar metaphors that do not differ in familiarity from their literal interpretations should not differ from them in likeability (as shown in Giora et al., in press). In sum, it is optimal novelty that accounts for aesthetic judgments as shown also for idioms (*don't know your right from left*) when intended nonidiomatically (see Experiments 3–4).

Indeed, any view that assumes that a single factor should explain pleasure effects will not account for all our findings. For instance, the-effect-of-mere-exposure model (Bornstein & D'Agostino, 1992; Harrison, 1977; Kunst-Wilson & Zajonc, 1980; Zajonc, 1968, 1980, 2000), according to which it is (moderate) familiarity that should induce (highest) pleasure, accounts for only some of our findings. Its predicted association between increase in familiarity and pleasure (up to a point following which increase in familiarity results in decrease in pleasure) might account for the monotonic increase in both familiarity and pleasure found for the

unfamiliar (pure innovation), the less familiar (variant version), and the most familiar (original) items (see Table 2 and Figure 1). However, it cannot account for either the highest pleasure ratings induced by the moderately familiar optimal innovation or for the highest pleasure ratings induced by highly unfamiliar optimally innovative metaphors. Nor can it account for the low pleasure ratings induced by low familiar items or for the relatively high pleasure ratings induced by the highly familiar stimuli. In all, though it could account for some, it cannot account for all of our findings taken together.

This is also true of the arousal model (Wundt, 1874), according to which, it is (moderate) arousal that should induce (highest) pleasure. Indeed, these models, which assume a single dimension, predict pleasure effects that are not corroborated by our results.

Our approach is similar to that of Berlyne's (1971), who assumes two mechanisms of reward: "First, there is relief through habituation, through sheer dulling of the impact by repetition. Secondly, there can be relief through perceptual and intellectual processing, in consequence of which conflicts induced by a novel pattern are resolved" (p. 196).[3] Note however, that whereas all the other models were supported by testing the effects of repeated exposure, our studies did not involve repeated representation.[4]

Taken together, our findings support the view that it isn't nonliteralness that is pleasing. It is not metaphor, then, that makes mind and language poetic, but optimal innovativeness.

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[3]Berlyne indeed looked at more than one variable when he considered pleasure (e.g., the variables of familiarity/novelty and simplicity/complexity). However, the variable of familiarity/novelty was only a function of the number of exposures of a stimulus (either simple or complex) during an experimental session. It is quite possible, for instance, that simple stimuli are more familiar to participants than complex stimuli due to prior experience with their simple gestalt (e.g., cube). This, however, was not established independently of the number of exposures involved in the experiments (e.g., Berlyne, 1970), which might render the familiarity/novelty variable suspect.

[4]A note is in order here concerning Relevance Theory (RT; Sperber & Wilson, 1986/1996). On the face of it, one might suspect that RT could account for our results. This, however, cannot be true of those results obtained out of context (e.g., Experiment 1). But, even if we forgo this reservation, even though some findings can be accounted for by RT (see also Pilkington, 2000), the whole array of findings cannot. For instance, the finding that the most highly familiar stimuli are speakers' second-best choice in pleasurability is not predictable on RT, according to which such stimuli should be irrelevant (Sperber & Wilson, 1986/1996, p. 120). Similarly, items diverging in pleasurability (e.g., familiar vs. unfamiliar metaphors) are actually equally optimally relevant, (Experiment 5 & Giora et al., in press), which suggests that the notion of optimal relevance cannot account for the variety of findings reported here, nor does it have to. (On the difficulty of distinguishing "poetic" from nonpoetic utterances in terms of RT, see also Giora, 1997a.)

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