Goldilocks Aesthetics

James E. Cutting

Abstract: Much of aesthetics is based in psychological responses. Yet seldom have such responses—couched in empirically based psychological terms—played a central role in the discussion of movie aesthetics. Happily, Todd Berliner's *Hollywood Aesthetic: Pleasure in American Cinema* does just that. This commentary discusses some history and some twists and turns behind Berliner's analysis.

Keywords: aesthetics, complexity, hedonics, modeling, movies

> *"Tastes can be diverse and yet depend on common factors and principles. For example, different people's evaluations may be governed by the same variables, but the values of these variables that are optimal for some individuals will not be optimal for others. The curves that can be drawn . . . may well be distinct but have the same general shape."*
>
> *— Daniel Berlyne*

In his book *Hollywood Aesthetic: Pleasure in American Cinema* (2017), Todd Berliner lays out a theory of how and why popular cinema succeeds in entertaining millions of viewers. His book is provocative and convincing, full of detailed examples from particular movies and fascinating general insights.[1] His basic argument is that Hollywood is a fine-tuned production system for generating moderately complex stories within genre formulae, which are told in a moderately complex way and with attention to production values (decoration) in order to please general audiences. Hollywood's movies vary along multiple dimensions and have sufficient appeal to the widest possible audience. At issue, of course, is how to appeal to that audience. No one knows how to guarantee the success of a particular movie, but it is undeniable that many movies succeed handsomely.

For me, the book is extremely welcome. It is grounded in my home discipline—psychology. The purpose of this commentary is to frame those grounds, providing background to the psychological theory on which Berliner bases his work. Let me start by borrowing from Robert Southey's early-nineteenth-century popularization of the story of three bears. In essence, Berliner suggests that for any movie viewer generally there is a Goldilocks zone—the porridge is the right temperature, the chair is the right height, the bed is the right softness, and the movie grabs her emotions and thoughts in an all-encompassing

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way.[2] In the domain of the narrational structure of movies, this is an idea toward which I am quite partial (Cutting 2019). Moreover, Daniel Berlyne's is one of the most enduring ideas in psychology and it has since spread to economics (Kaimann et al. 2018), consumer research (Anand and Holbrook 1986), information science (McCormack and d'Inverno 2012), and now to movies.

Later in the nineteenth century, Southey's idea found its way into psychology through the German psychologist Wilhelm Wundt. It was then filtered through the ideas of the British-Canadian psychologist and aesthetician Daniel Berlyne.[3] It also has several variants. One is the discrepancy hypothesis (Blijlevens et al. 2012; Haber 1958; McCall and McGhee 1977),[4] which suggests that people have a preference for stimuli that differ slightly, but not too much or too little, from a norm. Another is the "law" of Yerkes and Dodson (1908), where people are said to perform better at a moderate level of arousal rather than either at a lower or higher level. And a third is an opponent-process theory (Solomon 1980; Solomon and Corbit 1974) for which reward and aversion accommodate the temporal patterns of love, addiction, and many other motivational situations.

For Berliner, through Berlyne, the relationship between viewer interest and movies is captured by what is typically called the Wundt curve. A version of it, slightly different than Berliner's (26) and sourced here from Berlyne (1970), is shown in the middle panel of Figure 1. The left panel shows a simplification of Wundt's figure, which has a much narrower band of variation for which positive hedonic value is high. Across the succeeding literatures on aesthetics, arousal, and preference, the axes of this type of plot are given in many differ-

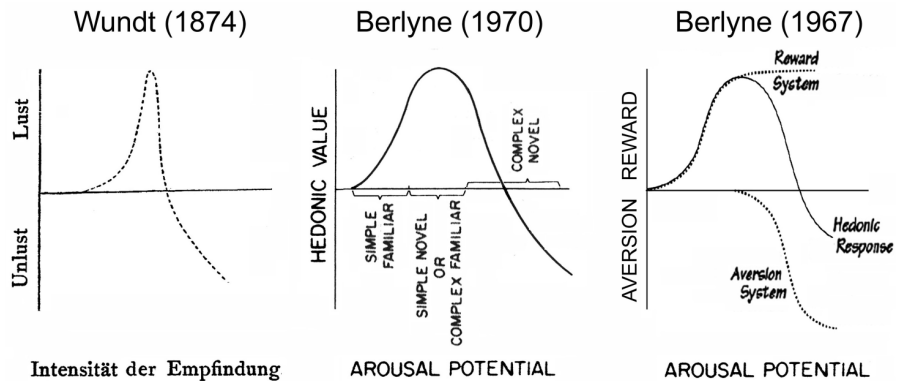

Figure 1. Three representations of the relation of hedonic value (roughly, sensory pleasurefulness) to arousal potential (roughly, the potential response to a stimulus by our autonomic systems of heart rate, blood pressure, and skin conductance). The left panel is simplified from Wundt (1874: 432, 1910: 323) and reworked into modern graphic form. The German abscissa label translates as "intensity of sensation" and the ordinate labels roughly as "pleasure" and "displeasure." The central panel is modified from Berlyne (1970), an article that investigates novelty and complexity, two features that Berliner is interested in with respect to movies. The right panel is reworked from Berlyne (1967, 88; see also Galanter 2012) to show the workings of opponent systems of reward and aversion.

ent ways. Berliner chose those from Berlyne (1960, 1971)—arousal potential on the horizontal axis and hedonic value, in his case how much one likes a movie, on the vertical axis.

The notion of arousal potential, rather than simply arousal, is important. It acknowledges that, as Berlyne notes in the epigram, some stimuli (movies) can affect people in different ways and at different times. According to Berlyne (1971), such arousal is dependent on three attributes. First, there are *psychophysical* properties. As an example, consider temperature. Generally, we do not like weather that is too cold or too hot. In between is best. One can imagine a movie bleached out or too dark to have general appeal. Second, there are *ecological* properties, for example, those that are biologically noxious or beneficial but also such things as meaningfulness and personal relevance. Cultures, and the individuals within them, vary widely in their embrace of a panoply of such properties. South Asians seem to like musicals more than North Americans do. And finally, there are *collative* properties. Collative is the adjective of the verb *to collate*. It means to collect and compare, gather information from diverse sources, and then be able to rank order things based on all that information. For example, I might like movie A, because of its actors and action sequences, better than I like movie B, even though the latter has better plot structure and computer graphics.

Collative variables are evaluative. Examples include complexity, novelty, conflict, uncertainty, suprisingness, and ambiguity.[5] However, Anthony Chmiel and Emily Schubert noted that "while Berlyne proposed that all three types of variables contribute towards aesthetic preference, his legacy is the discovery of collative variables and the idea that these are the 'most significant' determinants of preference" (2017, 887). To his credit and again following Berlyne's epigram, Berliner does not want to divorce his approach from the ecological variables, particularly those experiential and idiosyncratic aspects of a movie viewer's personal makeup and history.[6]

Berlyne's intent was to argue that collative variables, particularly novelty and complexity, could be "usefully discussed in the language of information theory" (1971, 69–70). These could be pitted against hedonic value—observer preferences—to yield the Wundt curve. But he started simplistically. For example, he measured familiarity as the number of times that listeners heard a novel melody. And he measured complexity in terms of the number of sides of a polygon (Berlyne 1970). Unfortunately, his own data did not really reveal the pattern of the Wundt curve.

Remarkably, one would be hard-pressed to find an idea more persuasive in psychology than Berlyne's that has also resisted corroboration so thoroughly. For example, across more than a dozen experiments, Edward Walker (1981) came up essentially empty on finding evidence for Berlyne's theory and the Wundt curve. In addition, Manuela Marin and colleagues (2016) cited a dozen

other papers, each often with multiple experiments, that also yielded nonsupportive results. Instead of an inverted U-shaped function, hedonic judgments typically increase with complexity or decrease with familiarity. In a yeomanly, back-bending effort to wrest support for Berlyne, Chmiel and Schubert (2017) recategorized results of studies that looked at preferences for musical patterns that differed in complexity or familiarity. Their argument is that those with linear increases might have sampled stimuli belonging to only the left-hand shoulder of the Wundt curve and that those with linear decreases might have sampled stimuli only pertinent to the right-hand shoulder. Counting these two patterns of results as supportive of Berlyne, plus the few studies that actually did find the inverted-U, they counted 50 of 57 studies (88 percent) in support of Berlyne. However, excluding the linear cases the support is much more meager—only 15 out of 57 (26 percent). Not impressive.

Why is this? Why is it that an idea that fits so snugly into our intuitions is so difficult to corroborate? My answer is threefold. First, I think we should forget about arousal. When one plots a graph, one typically thinks that the variation on the horizontal axis causes the variation on the vertical axis. But we now know that equal values of arousal (for example, the autonomic measures of heart rate, blood pressure, and skin conductance) can be associated with both positive and negative responses. Thus, arousal per se only confuses the issue. Second, hedonic tone—the ability to feel pleasure—is itself multidimensional and dependent on the stimulus set. Photographs, paintings, and cartoons may all elicit different kinds of hedonic responses (Cupchik 1986; see also Marin et al. 2016).

Third, and as Berlyne (1971) explained, to generate a U-shaped function one generally needs two processes and a staggered relation between them. One process generates the upward part of the function and a second process generates the downward part. Moreover, these become relevant in different collative ranges, one in the lower range and one in the upper range. A schematic example is shown in the right panel of Figure 1, a graph modified from Berlyne (1967; see also Galanter 2012). The two processes are a reward system and an aversion system or, perhaps with a more provocative association from Wundt's German, *lust* and *unlust* (see the left panel of Figure 1). The neurophysiology of these systems is beyond what we need here, but the two systems are separable and well ensconced in contemporary theory and data (Hu 2016).

Consider the graph in the right panel of Figure 1. The reward system builds in its response to a collative property. It forms an elongated S-shaped curve that is asymptotic at both ends, one at indifference on the left and the other at some maximum value on the right. With increases in the collative variable, the aversion system does not kick in immediately, but waits until some threshold is exceeded. It then follows a function that is also an elongated-S and doubly

asymptotic but with a reversed polarity and a bit greater in magnitude. Add the two together and you have a Wundt curve. This underlying, two-process account is exactly what one finds in other, related domains (for example, Solomon and Corbit 1974), although the component curves can be shaped somewhat differently.

My guess is that the failure of research to find Wundt curves for many collative variables is that there is nothing aversive in the stimulus set that has been used, and sometimes nothing particularly rewarding either. Polygons with more sides are just more complex; they are not aversive. Similarly, more intricate, short sequences of tones are also just more complex, and again not aversive. Moreover, one would be hard-pressed to say that any polygons are particularly rewarding, although some short ditties might be.

Gratifyingly, much recent research has found Wundt-curve-endorsing results. Celeste Kidd and colleagues (2012) found that, using carefully calibrated information-theoretical criteria, infants preferred visual sequences of moderate complexity over those that were both simpler and more complex. And Pietro Gravino and colleagues (2019) studied big data from recommender systems, those online algorithms that recommend books, songs, and other items based on what the internet surfer has purchased. Among popular songs, they found that an individual listener was more likely to listen to a song they had heard, say, ten times before than one they had listened to fifty times or only twice. Such results suggest that familiarity and novelty both drive preferences, with a Goldilocks zone in between.

Berliner's book is divided into five parts, and his précis in this issue recaps those. First, in writing about Hollywood classicism and deviation, Berliner says: "Hollywood's deviant tendency . . . reaches toward complexity and novelty in order to produce films that mass audiences find interesting and moderately challenging." The middle panel of Figure 1 from Berlyne (1970) endorses this view completely—as long as the reach is not too far.

Second, in discussing narrative Berliner suggests that "Hollywood balances narrative unity and disunity." This is a slightly different view of what underlies hedonics, and it is endorsed by George Birkhoff (1933), Murray Gell-Mann (1995), and Philip Galanter (2012). These authors believed that midway along a single dimension from order to disorder (order to chaos) should prove most interesting. At the border between the two are fractal systems, which may indeed be a domain that is aesthetically the most attractive (see Cutting et al. 2018). Supporting this idea, Güçlütürk and colleagues (2016) generated complex visual patterns for aesthetic judgments by viewers. Importantly, they first normalized results within individuals and then made comparisons across them. This procedure yielded an inverted U-shaped pattern for individual preferences, which was absent when no individual differences were

considered. Similarly but back in the two-process domain, Alexandre Sousa and colleagues (2019) modeled preferences to popular music along three collative variables—novelty, complexity, and uncertainty—and, once they were combined, found separate and different Wundt curves for individual listeners. These two sets of results are important, and they are congenial to Berliner. Moreover, they may explain why many of the earlier results were inconsistent with Berlyne's theory, because individual differences were not considered.

Third and considering film style, Berliner emphasizes clarity, expressiveness, and decoration as making movies spontaneously pleasing to mass audiences. Stylistic harmony also contributes, but he also notes that stylistic dissonance "inspires cognitive play . . . Dissonance . . . generates aesthetic interest by creating inconsistent objects—objects of curiosity." This play pushes movies into a domain of the more complex and may require a more sophisticated viewer to appreciate, again emphasizing that different viewers may have different Wundt curves. Fourth, "the ideological restriction of the Production Code Administration posed creative problems that noir filmmakers solved through visual and narrative contortion." These have challenged audiences with their complexity, stimulating the sophisticated viewer but perhaps leaving other viewers less enthusiastic.

Finally, "to fully exploit the pleasures of genre filmmaking for a mass audience, a genre film must fit within traditional genre parameters, offering easy recognition, but it must also differ enough from previous films to make it moderately challenging for average spectators." This view also finds empirical support. Sameet Sreenivasan (2013) looked at the keywords viewers had used to tag all movies on the Internet Movie Database (IMDb)[7] between 1930 and 2010. He then measured the general uniqueness of the terms used by viewers for each particular movie compared to those terms used for all movies released in prior years (dating from 1910). In general, the movies that were most successful were ones that had an intermediate number of unique terms. Movies with fewer unique terms and those with more unique terms did not do as well at the box office. This supports the idea that Hollywood movies continually search out new but related themes as they continue mostly to match the genre expectations of viewers.

In summary, Berliner's appraisal of the success of Hollywood in terms of aesthetics is well-grounded. Its backbone is Berlyne's theory of hedonic value. Here, I have reviewed and updated that theory—one that had a rocky existence in the latter third of the twentieth century—to find consistent and relevant empirical support in the domain of movies and entertainment. It really is the case that we share a lot with Goldilocks as we forage for pleasure in the world around us.

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Notes

[1] The epigram is from Berlyne (1971, 29).

[2] The notion of a Goldilocks zone is also important to astronomy and exobiology as the circumstellar habitable zone around a star—neither too close nor too far—where the temperature is appropriate for life to evolve and be sustained.

[3] Berlyne (1971) noted that Aristippus, the Cyrenaic philosopher, presaged his curvilinear hedonics. With some Google sleuthing, I was able to find this: "The motion of which we have sensation is of three kinds: feeble motion, to which we remain indifferent; violent motion, which is in disaccord with nature, and which we describe as pain or suffering; and lastly, motion of the easy and gentle kind, which is congenial to nature, and which we describe as a movement of pleasure" (Stökl 1887, Part 1).

[4] I worked as a research assistant under Robert McCall on some aspects of this project nearly a decade before this chapter was published.

[5] See Berlyne (1960; 1971).

[6] Berliner (2017: 26) notes that "the inverted-U findings indicate that subjects prefer challenging properties—novelty, complexity, etc.—in increasing intensity until some maximal level, at which point subjects start to become overwhelmed." Here, I take Berliner to use the notion of "intensity" not as a physical measure (like loudness), but as a metaphor for increasing novelty or complexity.

[7] See www.imdb.com.

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