

## EVOKED POTENTIALS

## Social Context Influences Creative Success

The success of a creation should, in theory, be determined by its creator, who is in the best position to determine how closely the creation matches the original vision. But in science, as in other creative endeavors, this is not the case. Success in science requires funding and publication, which does not arise from scientists' opinions of their own work, but rather from the judgment rendered by a peer group comprising reviewers and editors.

This socially determined valuation of a creative effort helps to determine what society (or any social grouping) deems to be important. How much value we place on a new creation influences its creator's drive to bridge the perceived gap between what is and what should be. The satiation of that creative drive is a biologically and psychologically relevant measure of creative success because it influences the likelihood that the creator will react again in the future to such perceived gaps, thus perpetuating creative behavior. Other factors may influence the degree of such satisfaction, including the reward received; the value that the creator's culture places on individual attainment (*Annu. Rev. Psychol.* 2003;54:403-25); enjoyment of the creative effort itself, as expressed in Mihály Csikszentmihályi's "Finding Flow: The Psychology of Engagement with Everyday Life" (New York: Basic Books, 1997); and the nature of the creation itself, in that creators who serve the greater good may get a greater sense of happiness, as discussed in Jonathan Haidt's "The Happiness Hypothesis" (New York: Basic Books, 2006).

Although the creator's opinion is important, Dr. Csikszentmihályi's "systems model" of creativity highlights the role of society in which a gatekeeper determines what creative work will be admitted to the existing intended domain ("The Nature of Creativity: Current Psychological Perspectives" [Cambridge: Cambridge University Press, 1988, p. 325-39]). Because society cannot know the creator's vision and so cannot match the creation to the vision, an external set of aesthetic rules is needed to judge creative achievement.

Aesthetics are the cooperatively determined hierarchical categorization and quantification of quality, ex-

pressed as rules or principles. Aesthetics reflect the opinions and values of the social grouping in which creativity arises. For example, the aesthetic value of a painting lies in the artist's choice of color and form, and the aesthetic value of a scientific experiment lies in its methodological rigor, but the general principle of judging excellence is similar for both art and science.

How do we arrive at a set of aesthetic rules? Arguably, neurophysiology might lend some degree of objectivity. For example, neuronal receptive fields and firing patterns reflecting tonal quality, timbre, pitch, temporal structure, complexity, and familiarity of music can be measured (*Nat. Neurosci.* 2005;8:1241-7), but even so, there must be some determination of which responses or qualities are best. As a society, therefore, we must agree to a set of principles that define a work as being good or bad.

Just as social norms define what conduct is expected and tolerated within a given society, aesthetics define what is desirable and undesirable within artistic, scientific, and other creative communities.

Leaders influence such norms, and within the social or professional grouping promote cooperation among its members to conform to the set standards (*Nature* 2003;422:137-40). Within large social groupings, cooperation can be and usually is enforced by the membership, either through designated experts or simply in the form of peer pressure.

Social norms are necessary because one person's actions affect other members of the group. Evolutionary psychologists have provided evidence that our minds have evolved a social contract algorithm specialized for detecting liars, cheaters, and rule-breakers – those individuals who violate social law. Neuroeconomists suggest that social norms are based on "conditional cooperation," in which the level of cooperation of each group member is based on the level of mutual cooperation of all the members. If mutual cooperation is high, then individual cooperation is

high. On the other hand, if I see many people breaking the law, benefiting as a result, and getting away with it, then I will be more likely to take a chance by breaking the law, too. Looting during times of social upheaval is a familiar manifestation of this principle.

For a paradigm, law, or any social norm to prevail, it must be enforced (*Nature* 2002;415:137-40). And for the aesthetic principle to endure, social (aesthetic) norms must be enforced, and noncooperators (those who fail to comply with accepted aesthetic principles) punished, leaving their papers unpublished or grant applications unfunded.

As I mentioned in the February issue's discussion about motivation, we like justice and we dislike injustice. Exacting social justice activates striatal and orbitofrontal reward substrates (*Science* 2004;305:1254-8), so we have powerful neurobiological drivers that serve to maintain social order.

However, social norms, aesthetic principles, and scientific paradigms can change. When the cost of cooperation with such a principle rises, due perhaps to mounting evidence that the scientific paradigm is wrong, the level of mutual cooperation will drop. Recall that if the reward value of an ongoing action drops, the reduced reward is the signal that drives the formation of a new action plan.

When mutual cooperation with a social norm drops and defection rates rise, the social norm is destined to break down. In science, this is termed a "paradigm shift," as described by Thomas S. Kuhn in "The Structure of Scientific Revolutions" (Chicago: University of Chicago Press, 1970).

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Aesthetic laws, as practiced at the peer-to-peer and leadership levels, define and validate the merit of a creation. Aesthetic rules, when they are enforced by credible authorities, become accepted fact. We may even extend this principle to another human creation – morality – and we shall do so next month. ■

DR. CASELLI is the medical editor of CLINICAL NEUROLOGY NEWS and is a professor of neurology at the Mayo Clinic in Scottsdale, Ariz.



RICHARD J. CASELLI, M.D.

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► Improved pain assessment and management within federal health care and financial programs.

► Patient education on management of their own pain through public health communication strategies.

► Decreasing disparities in the pain experience among subgroups of Americans.

The emphasis on patient self-management of pain also is critical, Dr. Lane said. "Education on pain and how to treat it will empower the patients, just as the arthritis self-help classes have done for years. They improve self-efficacy."

"You cannot control pain if the patient does not deal with it," Dr. Altman agreed. "If a patient doesn't have an investment and take control of their pain, they are not going to get better."

"Fibromyalgia is so prominent throughout the country," he added, "that to think about not having the patient in-

vested in their pain control is really an exercise in futility."

Improvement of pain management and prevention efforts among underdiagnosed and/or undertreated subpopulations is another tenet of the report. Those at risk include surgery and cancer patients; people at the end of life; racial and ethnic minorities; people with lower income and education levels; women, children, and older people; and military veterans. This need is not unique to

**The report 'ignores the fact that there are different types of pain specialists. ... They are talking about an anesthesia-oriented pain specialist, not those who deal with pain as a specialty.'**

pain, Dr. Altman said. "That same disparity exists in all medical care. People who are at risk for not having pain con-

trol are the people who are at risk for not getting medical care. It's the same population."

Strategies to reduce barriers to pain care are among the recommendations that should be implemented by the end of 2012, the report committee said. Support of greater collaboration between pain specialists and primary care clinicians also should be established by the end of next year.

In addition, an existing institute within the National Institutes of Health should become the lead institute and responsible for moving pain research forward as well by the end of 2012, the report states. The NIH Pain Consortium also should take a stronger leadership role in fostering the necessary research. Dr. Altman was somewhat pessimistic about these proposals. "They make a recommendation in here that the NIH devotes some specific groups to pain control. Good luck with that in this financial climate."

Ongoing efforts to enact the remain-

ing recommendations in the report, the authors stated, should be finalized by the end of 2015.

Dr. Lane and Dr. Altman said that they had no relevant financial disclosures.

The report is available from the IOM at [www.iom.edu/Reports/2011/Relieving-Pain-in-America-A-Blueprint-for-Transforming-Prevention-Care-Education-Research.aspx](http://www.iom.edu/Reports/2011/Relieving-Pain-in-America-A-Blueprint-for-Transforming-Prevention-Care-Education-Research.aspx). ■

## LETTERS

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**Mail:** Letters, CLINICAL NEUROLOGY NEWS, 5635 Fishers Lane, Suite 6000, Rockville, MD 20852

**Fax:** 240-221-2541

**E-mail:** [clinicalneurologynews@elsevier.com](mailto:clinicalneurologynews@elsevier.com)