

The Secret Agents of Art and Science

Ken Stange

Nipissing University

North Bay, Ontario, Canada

Creativity in the arts and in the sciences, the similarities and the differences, is the subject of my recently completed book entitled *The Secret Agents: Creativity In The Arts and Sciences*. It has as its premise that science and art are ‘secret agents’ passing intelligence between the two sides in the Cold War of “The Two Cultures” originally described by C.P. Snow half a century ago. Years of interacting with students in a course on the Psychology of Art (where the arts are studied from a scientific perspective) gave the impression that this collaboration still remained a ‘secret’ to them; i.e., that there still is a perceived schism, despite the actual increased interaction of the arts and the sciences. To determine the extent of this assumed misperception 153 first-year Introductory Psychology students were given a Likert scale questionnaire to determine their attitudes toward the sciences and the arts, including evaluating their relative importance, the degree of creativity involved in each, and the nature and extent of relationship between these two endeavours. Analyses of the results suggest that, among these young university students, scientists are definitely perceived as less creative. Also, while both art and science are considered important, science is viewed as more important than art, while art is seen as more interesting. However, the somewhat surprising result of this survey was that there is considerable appreciation of the importance each endeavour has to the other. Most practicing artists and scientists are aware that they share the same goal of apprehending reality, albeit by different means. The artist is enabled by science and the resultant technology offering up new creative tools and new ideas for speculative exploration. Scientists draw inspiration from the artist’s imagination, with just one example being science fiction writers hired as consultants in ‘think tanks’ evaluating future developments in an increasingly technological world. However, it was surprising to find that this sample of the current generation of young people also seems to appreciate the extent of interaction between the arts and sciences, even though they still perceive doing science as less creative than doing art.

INTRODUCTION

Protagoras allegedly claimed, “Man is the measure of all things.” (Plato, 2010) Most of us no longer believe this, for it is difficult to maintain the illusion of our special significance at the centre of the universe now that we know how vast that universe is—in both space and time. So now we ask, “What is the measure of Man?” What has *homo sapiens* accomplished to even begin to justify the anthropocentrism Protagoras’ words apparently express? What, if anything, truly distinguishes us from other species? One very reasonable answer is *civilization*. But then one has to say what defines civilization. I would argue it is art and science, the two apparently unique accomplishments of our species. And the underlying motive for these accomplishments is the creative drive.

The nature of creativity in the arts and in the sciences and this symbiotic, but often troubled, relationship between these two domains is the subject of my book *The Secret Agents* (Stange, 2008). This relationship increases in importance as scientific knowledge increases exponentially and art continually redefines its domain in ever larger and larger terms.

It has been suggested that some creativity exists in other species, and that if art and science are defined broadly enough, they are not unique to human beings (Stange, 2009). For example, if science is taken to include any problem solving and prediction based on empirical evidence, then other primates, dogs, and even crows could be said to practise the scientific method (e.g., “Crows can use,” 2009). And if the paintings of elephants and chimps, or the non-stereotyped songs of certain birds, can really be considered art (as one can conclude they are by the numerous websites offering such animal art for sale), our unique status even here is questionable. However, as in the debate about animals having language, it very much depends on where on the continuum one chooses to draw the line of demarcation; i.e., on how high the bar is set. But certainly no other species comes even close to *homo sapiens* in the domains of art and science.

The obvious next question to ask is what is it that motivates our obsession with doing art and science. It has to be a profound deep-seated desire to apprehend reality, and not just the pragmatic reality that directly affects our survival and the perpetuation of what Richard Dawkins calls the “Selfish Gene” (Dawkins, 1989). We are driven to apprehend something far deeper: we want to grasp what Immanuel Kant (1987) might have meant by the “noumena” that lay beneath sensible “phenomena”. We continually attempt to get at this underlying reality by using the methods of art and science. We get a deeper understanding of water both from a Turner seascape *and* from understanding how the two gases, hydrogen and oxygen, can combine to make the curious liquid compound that is essential for life as we know it.

There is no better phrase to describe this desire to probe beneath mere sensible reality than ‘creative drive’, and there is no better word to describe this probing activity than ‘creativity’. So it is a strange twist in the history of ideas, that these two endeavours, art and science, which share a common motivation and common goals, but just apply different methodologies, should become alienated from each other. But they have. The

great poet, John Keats (who really should have known better) famously bemoaned, in the spirit of the Romantic Movement, Newton “unweaving the rainbow” (Keats, 1994). And many scientists seem to consider art no more than, at best, entertainment or, at worst, frivolous irrational nonsense—especially as science has become more and more specialized and professionalized.

C.P. Snow, who was both a scientist and an artist, remarked on this in his controversial 1959 Rede Lecture where he coined the now common phrase “The Two Cultures” to describe art and science as virtually warring cultures, where the artist was profoundly ignorant of science and the scientist profoundly ignorant of art (Snow, 1959). Much to Snow’s (perhaps naïve) surprise, his remarks alienated both scientists and artists, both of whom understandably didn’t like being told they were ignorant of an important part of what makes us humans special.

Nevertheless, C.P. Snow was right. Artists not knowing to what the Second Law of Thermodynamics refers, and scientists not knowing to what Third Person Narrative refers, are both appalling signs of ignorance of some of the basic canons of the other’s domain. The artist who naively accepted astrology as science, or the scientist who blithely dismissed poetry as no more than meaningless word salad, were not unusual. And Snow was justified in lamenting this fact.

However, there is evidence that the divide between the two cultures has been closing, largely because of the obvious influence of one field on the other that occurred even before the more dramatic developments of the last decade (Stange, 1998). Now most practicing artists and scientists do seem to be aware that they share the same goal of apprehending reality, albeit by different means—and do respect each other for this. The artist is obviously enabled by science—and by the resultant technology offering up new creative tools and new ideas for speculative exploration. (This is perhaps most evident in the use of digital technology in the creation of new art media.) And scientists now draw inspiration from the artist’s imagination. One example being science fiction writers hired as consultants in ‘think tanks’, including even American Homeland Security, to evaluate future developments in an increasingly technological world (Page, 2007).

Nevertheless, it seems that the general public, even young university students, still fail to understand how common is the ground between art and science. Having for many years taught a course on the Psychology of Art, a subject that uses science to understand art and art to illuminate science, I’ve had the impression that there still is a perceived division between Snow’s “Two Cultures”. To determine if this impression was correct, I gave a brief questionnaire to my Introductory Psychology students asking about some of their attitudes toward—and perceptions of—the nature of the sciences and the arts, as well as the relationship of each to the other.

METHOD

A Likert Scale questionnaire (Appendix A) was given to 153 students in an “Introductory Psychology” course at a small liberal arts college. The majority of the students were female (73%) and under the age of 21 (74%), with only 6% being over 30. (Alternative answers were randomly sequenced to control for list-order bias.)

The questions were designed to determine their opinion regarding the following questions.

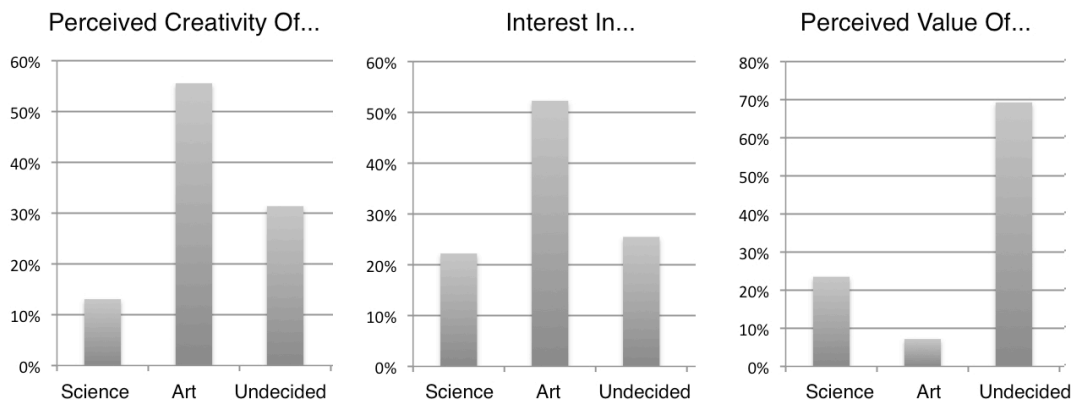
- Whether they considered artists or scientists more creative.
- Whether they were more interested in science or in art.
- Which they considered more important: science or art.
- How knowledgeable they felt about science and about art.
- How knowledgeable they felt scientists were about art, and artists about science
- How important they felt science was to art, and art to science.
- How important aesthetic judgment was in science and in art.

RESULTS

Whether artists or scientists were perceived as more creative. On the basis of this question, students seemed to clearly consider artists as far more creative, with only 13% considering a Nobel Prize Laureate in Physics as more creative than one in Literature, while 56% considered a Nobel Prize Laureate in Literature more creative than one in Physics. The remainder (31%) felt it depended on the specific accomplishment.

Whether they had a greater interest in art or science. Students also expressed more interest in the arts (55%) than in the sciences (22%), with 23% expressing equal interest in both.

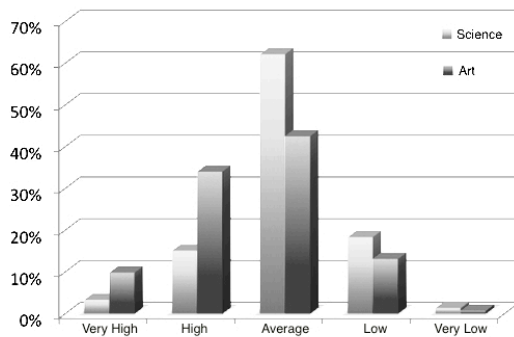
The relative importance attributed to science and art. Most students indicated they felt both endeavours equally important (59%), but most of the remainder felt science was more important (24%), with only 7% considering art more important.



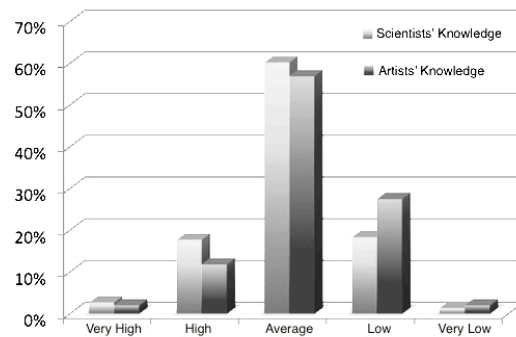
Self-evaluation of their knowledge of art and science. 44% felt they were above average in their knowledge of art, while only 18% felt they were above average in their knowledge of science.

Perception of artists' and scientists' knowledge of the other's domain. They seemed to feel that scientists in general knew more about art than artists did about science, with 21% thinking scientists had above average understanding of art, while only 14% felt artists had above average understanding of science. However it should be noted that the majority felt that artists' and scientists' knowledge of the other's domain was average: (62% for scientists' knowledge of art and 42% for artists' knowledge of science.)

Self Evaluation of Knowledge About Science & Art



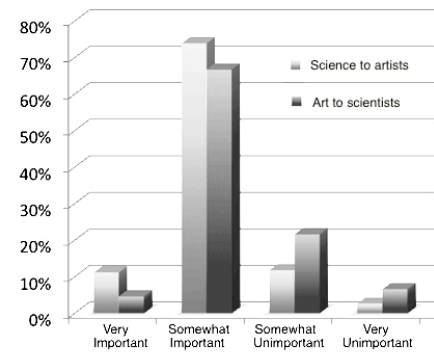
Estimation Of Scientists' & Artists' Knowledge Of Each Other's Domain



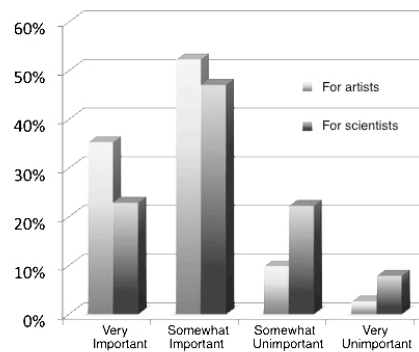
Perceived importance of one field to the other. The majority felt that both fields were of importance to each other, with 85% believing developments in science of importance to the artist and 73% feeling developments in the arts of importance to the scientist.

Importance of aesthetic judgment in art and science. 85% felt aesthetic judgment important for artists, while 70% felt aesthetic judgment important for scientists.

Estimation Of The Importance Of One Domain To The Other



Estimated Importance Of Aesthetic Judgement In Art And Science



DISCUSSION

The belief that science is a less creative endeavour than art still seems to be entrenched in the minds of students—and probably the general public. While art is more interesting to these young people, science is seen as more important, yet doing science still appears to be considered a more mechanical endeavour, one that, while requiring intelligence, does not require original or imaginative thought. It is interesting that they felt more knowledgeable about art than science even though they were in a social science class and probably had not taken very many courses in the arts.

Science is both a body of knowledge and a methodology for getting knowledge. It is evident in class that the emphasis in their previous science education has been on mastering a specific body of knowledge, while often ignoring the importance of science as methodology, especially that component of the methodology that involves creative playfulness. But play is as much the original impetus to scientific endeavour as it is for artistic endeavour (Stange, 2010). They may have more interest and assumed knowledge of art than science because they view science as work and art as play.

Despite this bias, the students surveyed showed a surprising understanding of the importance these two domains have for each other. Perhaps this is because developments in science have resulted in technological developments that are very evident in those arts popular with young people: i.e., film and music. So, appreciation of this is understandable. But what is more surprising is that they seemed to realize that art strongly influences science, and their apparent appreciation of the importance of aesthetic judgment in science confirms this awareness.

So they do not seem to believe in the cultural divide between art and science that C.P. Snow lamented. Their evaluation of the perceived understanding between scientists and artists implies this, as does their evaluation of the importance of one domain to the other and their realization of the value of aesthetic judgment to science. So in this context, what is anomalous about these findings is their devaluing the importance of creativity in science.

Two possible explanations come to mind. The first is methodological: the question intended to indirectly evaluate their views on the importance of creativity in the arts and the sciences by asking which Nobel laureates, those in physics or those in literature, were probably more creative may have been flawed. It might have reflected their specific views on the degree of creativity involved in story-telling or word craft versus that involved in the most mathematically difficult field of study for most high school students—who simply do not have the sophistication to appreciate the creativity involved in math. A more general question (like the others in the survey) which simply asked which endeavour they felt involved more creative thought may have been more to the point and yielded a different, more meaningful distribution.

The other plausible explanation is that contemporary science education so heavily emphasizes the body of accumulated knowledge and (albeit to a lesser degree) the rigor

of scientific testing that they don't acquire an appreciation of the role curiosity, playfulness, adventurousness, and intuition play in initiating the application of the scientific method. One way to bridge the chasm between art and science is to look at the human side of scientific investigation. A textbook on the nature of evolution and natural selection could be supplemented with a biography of Charles Darwin's life or readings from *Voyage of the Beagle* (Darwin, 1989). The lives of artists are far better known than the lives of scientists, and so the creative nature of their work is also far better appreciated. If the students had approached the initial question about Nobel laureates in physics with some knowledge of the lives of such brilliant and creative physicists as Albert Einstein or Richard Feynman, they might have been far less likely to devalue the role of imagination and creativity in doing science. If they actually know anything about these Nobel laureate's contributions to physics, what they know are the fundamentals of their theories—not how those theories were developed. They almost certainly are unaware of the creativity and imagination that led to the insights. Anyone familiar with Einstein's thought experiments, such as chasing a beam of light at light speed, would realize the role of imagination in the creation of his ideas. Reading Feynman's hilarious autobiography, *Surely You're Joking Mister Feynman*, (Feynman, 1997), or Gleick's book about Feynman, *Genius* (Gleick, 2002), or Isaacson's biography of Einstein (Isaacson, 2007), would surely abandon the stereotype of the physicist as a plodding nerd who spends his days scribbling arcane equations.

It seems that the chasm that opened up between art and science hundreds of years ago is finally being bridged, with a greater appreciation of what these two noble human endeavours have to offer each other. However, it seems there still remains a fundamental misunderstanding of the nature of scientific endeavour, a misunderstanding that underestimates the role of creativity and imagination. What if a science education included more content from the humanities, including biographical information about scientists? And what if art education included more information about the role of the scientific interests of artists in such things as harmonics in music or the geometry of perspective in Renaissance painting? Then would not both art and science students have a better appreciation of the importance of creativity to *both* endeavours?

REFERENCES

- Crows Can Use 'Up To Three Tools' In Correct Sequence Without Training.
ScienceDaily. Retrieved April 24, 2010, from <http://www.sciencedaily.com/releases/2009/08/090805144114.htm>
- Darwin, C. (1839). *Voyage of The Beagle*. London: Penguin Books. {Originally published 1839 and available online at Gutenberg Project as public domain.}
- Dawkins, R. (1989). *The selfish gene*. Oxford: Oxford University Press.
- Feynman, R. (1997). *Surely you're joking, Mister Feynman*. New York: Norton.
- Glieck, J. (1992). *Genius: the life and science of Richard Feynman*. New York: Pantheon.
- Isaacson, W. (2007). *Einstein: his life and universe*. New York: Simon & Schuster.
- Kant, I. (1784). *Critique of judgement* (Trans. W.S. Pluhar). Indianapolis: Hackett Publishing Co. {Book available online at Gutenberg Project as public domain.}
- Keats, J. (1805). "Ode on A Grecian Urn", *The complete poems of John Keats*. New York: Random House Modern Library Classics, p. 185. {Poem available online at Gutenberg Project as public domain.}
- Page, L. (2007). "DHS calls in sci-fi writers as consultants", *The Register*. Retrieved April 24, 2010, from http://www.theregister.co.uk/2007/05/31/sci_fi_consultants_at_the_dhs/
- Plato (2000). *Theaetetus*. (trans. J. Sachs). Newburyport MA: Focus Publishing. Retrieved April 24, 2010, from <http://www.pullins.com/BookViews/BV158510101x.pdf>
- Snow, C.P. (1959). *The two cultures*. Cambridge: Cambridge University Press.
- Stange, K. (1998). Intertwining The Two Cultures In The Year Two Thousand
Proceedings of the 1998 mathematics & design: proceedings of second international conference (ed. Javier Barrallo), Universidad del Pais Vasco Press, pp. 309-316.
- Stange, K. (2008). *The secret agents: creativity in the arts and sciences*. {Unpublished book available for reviewing online by contacting Ken@Stange.com}
- Stange, K. (2009). Chapter One: Art Creation and Appreciation: Uniquely Human?
Human characteristics: evolutionary perspectives on human mind and kind (eds. H. Høgh-Olesen, P. Bertelsen, J. Tonnesvang), Cambridge Scholars Publishing, pp. 2-16.

Stange, K. (2010). The Solemn Frivolity of Art And Charming Frigidity of Science. *The International Journal of Arts & Sciences*. (In press, Oct. 2010)

APPENDIX A: QUESTIONNAIRE REGARDING ART AND SCIENCE

These questions are about art and science. To be clear, “the arts” refers to all the arts including literature, film, and the visual arts, and “science” includes all the sciences including physics, biology and the social sciences such as psychology.

Answer **all** of the following questions with what **best** represents your opinion.

1. Which individual would you judge to *probably* be more creative?
 - A) a Nobel prize winner in Physics
 - B) a Nobel prize winner in Literature
 - C) I don't think either is inherently more likely to be creative.

2. Which are you more interested in?
 - A) the sciences
 - B) the arts
 - C) I am equally interested in both.

3. Which do you think is more important to human civilization?
 - A) the sciences
 - B) the arts
 - C) Both are extremely important, so impossible to say.

4. Compared to your fellow students how knowledgeable do *you* feel about science?
 - A) very knowledgeable
 - B) above average
 - C) average
 - D) below average
 - E) very unknowledgeable

5. Compared to your fellow students how knowledgeable do *you* feel about art?
 - A) very knowledgeable
 - B) above average
 - C) average
 - D) below average
 - E) very unknowledgeable

6. How knowledgeable about the arts do you feel the average scientist is?
 - A) very knowledgeable
 - B) above average
 - C) average
 - D) below average
 - E) very unknowledgeable

7. How knowledgeable about the sciences do you feel the average artist is?

- A) very knowledgeable
- B) above average
- C) average
- D) below average
- E) very unknowledgeable

8. How important do you think developments in the sciences are to artists?

- A) very important
- B) somewhat important
- C) somewhat unimportant
- D) very unimportant

9. How important do you think developments in the arts are to scientists?

- A) very important
- B) somewhat important
- C) somewhat unimportant
- D) very unimportant

10. How important do you think aesthetic judgment is in doing art?

- A) very important
- B) somewhat important
- C) somewhat unimportant
- D) very unimportant

11. How important do you think aesthetic judgment is in doing science?

- A) very important
- B) somewhat important
- C) somewhat unimportant
- D) very unimportant

Now please also answer these two demographic questions as well.

12. I am...

- A) Male
- B) Female

13. I am...

- A) less than 21 years of age
- B) 21 to 30 years of age
- C) over 30 years of age