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Trends in the creative content of scientific journals: Good, but not as good!

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How fitting the first entry in John Ayto's 1999 "*Twentieth century words*" is the word "*accelerator*"! Acceleration, rate, forward, advance are cliché images often associated with progress of science. The late Christopher Lasch opens "*The true and only heaven*" (1991) with the delusory simple question "How does it happen that serious people continue to believe in progress?" (p. 13). To add, three lines later, "in a century full of calamities". If the notion of progress in science is not innocent, that of creativity is above suspicion. The focus of this study is on creativity in social and behavioral science.

The solidest single achievement of this study is in setting up whether social and behavioral science journals are getting more creative or not with the passage of time. We may be unable to fully analyze a domain of science. But we may still opt for controlling the material drawing from the textual status of a domain of science and look into this material for indicators of the degree of change undergone. With science, you begin –and end– with words. After all, only facts mentioned in a text can be known. Titles are a valid representation of the reality of a scientific field (Bernard, 1995; Lindauer, 1988; Whittaker, 1989). They are also quickly available, and definite time-savers. By analyzing the titles of scientific journals, one puts in scholars' communications to the same empirical treatment they habitually apply to the subjects of their studies. What makes the analysis of written communication a sure-fire is that all the varied facts contained in journals become homogenized into a single class of equivalence through

the language used by scientists to communicate the facts of their discipline to others.

In literature, Martindale (1990) shows, novelists and poets use ever more vivid images and strong metaphors in response to pressure towards novelty. The unity of this chapter stems from taking scientific writing as literature while using pressure towards novelty as a formidable potential for change in literature and science. Novelists and scientists are aware of the high capacity of novelty as a source of arousal, and of the ghastly capacity of boredom to destroy significance. Another rule in science requires it to become ever more symbolic. Two centuries ago, Schopenhauer (1958) argued that a science of the concrete is a contradiction in terms. The rule to rise ever more above particulars is achieved by the constant accretion of generalizations of the various inputs into chunks representing increasing degrees of conceptualization. In psychological jargon, images and metaphors are dubbed primary or primordial thought contents (Kris, 1952). Their opposite, processes that represent degrees of conceptualizations, such as law and order, abstract thinking, temporal references and moral imperatives, are dubbed secondary or symbolic thought contents.

A work of science should find a knowledge niche where it copes with its forerunners while progressing by proposing refreshing changes. Pressure toward novelty is not the major constraint on science, but it is a constant one. Under pressure toward novelty, which breeds symbolic thought content, scientists normally offer new theories and altered frames of reference that make facts appear under a different light. Scientists

achieve their goal by moving toward more abstract ideas. Scientists also seek to correct the weaknesses of their theories. Either they offer new theories, or tweak older ones, or bring in new facts that are usually more complex (Weber, 1968). These new facts and theories correct the failures of the existing theory while also refining it. This sequence is repeated many times until anomalies and unintelligibility are so overwhelming that a reversal —a scientific revolution— is preferable to repairing the failures of die-hard theories (Kuhn, 1970). Each time this is put into action, science becomes more abstract and complex (Hayes, 1992): The cure for uncertain science is always more science. In this sense, the pressure toward novelty leads to more general theories because it often "brings several special theories together" (Alexander, 1987, p. 3).

So much for a model of scientific change. Martindale (1990) set up the primordial and symbolic thought contents into a measuring instrument for content analysis, the REGRESSIVE IMAGERY DICTIONARY. The difference between primordial and symbolic thought contents is that between the sensate and ideational systems of culture (Sorokin, 1985). In sensate systems, reality is that which is presented to the sense organs, in ideational systems, one considers that it is the inner meaning that gives value to the world. Sensate contents are "found in the world" *(love*, *sex*, *food*, *chaos*, *dream*, *flying*, for example). Ideational contents are "built into the world" (*money*, *work*, *discipline*, *police*, *time*, *justice*, *law*, to name a few).

An innocent notion can lead one occasionally to deep waters. Sorokin (1985, pp. 93 and 214) has shown how sensate systems of culture

are necessarily associated with individualism. Sensate words *love*, *sex*, *food*, *chaos*, *dream*, *flying* for example, are ever-changing sensate values that are the exclusive concern of the individual. At the other end, words *money*, *work*, *discipline*, *police*, *time*, *justice*, *law* represent durable ideational values that concern collectivities and their conventions. The possibility to connect creativity in science with morals comes in as an interesting surprise. Increases in creativity could be associated with increases in the interest in other people at least for what concerns the products of creativity. "Interest in other people" closely defines McClelland's notion of "need for affiliation" (1987). One can test the truth of this insight using one of the modules of the MOTIVE DICTIONARY (more anon). Evidence is needed. For while the products of scientific creativity can be associated with interest in other people, creative people are sometimes associated with madness: "A great soul…alternates between the highest height and the lowest depth" (Carlyle, 2004, lecture I, section II) (see also Martindale, 1971).

The general expectation from the prior studies reviewed here was that sciences would become ever more symbolic and abstract. The creative content of the titles of "*Psychological Review*" and the French *L'Année Psychologique* increased over the years 1894-1988 (Hogenraad, Bestgen, and Durieux, 1992). In a later study (Hogenraad, McKenzie, Morval, & Ducharme, 1995), the creative content of the titles of the *Journal of Applied Psychology* increased too, from 1917 to 1994, while that of *Harvard Business Review* decreased between 1923 and 1993. Also in 1995,

Hogenraad, Kaminski, and McKenzie showed how much the creativity of the *Journal of Criminal Law and Criminology* was damaged by memorable political events such as when capital punishment was reinstated in some American States. Elsewhere (Hogenraad, Boulard, & McKenzie, 1994; Hogenraad, Boulard, McKenzie, & Bash, 1997), the titles of five industrial relations journals were analyzed for signs of trends in their creativity. Industrial relations showed a serious inability to imagine new ways of representing the industrial and management reality. Finally, the analysis of the titles of *Empirical Studies of the Arts* (1983-1998) (Hogenraad & Martindale, 2001) revealed a glissade down followed by a modest upward movement. These analyses are revisited here with data updated to 2004 for four of these journals, *Psychological Review*, *Journal of Applied Psychology*, *Industrial and Labor Relations Review*, and *Empirical Studies of the Arts*. Now is an opportunity to reflect on these previous studies. Is the history of science written in advance, as if sealed in aspic? How much change did occur, or not, during the last decade and what part of these studies do we need to unsay?

Method

Data

The textual data include the titles of ten scientific journals. These are two century-old American journals, *Psychological Review* (4,009 titles) and the *Journal of Applied Psychology* (7,060 titles). The American

Psychological Association publishes both journals, and both data sets are updated to 2004. Next come the 4,694 titles of *Harvard Business Review* over 72 years, from its start in 1923 to 1994. For industrial relations, data sets include the titles of *Industrial and Labor Relations Review* (1,680 tittles), *Industrial Relations* (944 titles), the *British Journal of Industrial Relations* (766 titles), *Journal of Industrial Relations* (896 titles), and *Relations Industrielles/ Industrial Relations* (1,342 titles). The 3,591 titles of the *Journal of Criminal Law and Criminology* run over 81 years from 1910 to 1990. Finally, *Empirical Studies of the Arts*, the official journal of the "International Association of Empirical Aesthetics", contains 273 titles for the period 1983-2003.

Insert Table 1 about here

Content analysis

Many imagine they have explained a text when all they have done is told a story. Two qualities, in particular, serve to distinguish content analysis from even the best literary criticism: theory testing and quantifying. In part 10 of the play "*Frogs*", Aristophanes (1978) has character Aeacus scoff at Euripides "Levels they'll bring, and measuring-tapes for words", and later, "Euripides vows that he'll test the dramas, word by word". Yet this is what we do here. *Pace* Aristophanes, content analysis is insistent on the need to express facts through numbers. I analyzed the data with the help of the PROTAN procedure of computer-aided content analysis (Hogenraad, Daubies, Bestgen, & Mahau, 1995) and two

computer-readable semantic dictionaries, the REGRESSIVE IMAGERY DICTIONARY (Martindale, 1990) and the MOTIVE DICTIONARY (Hogenraad, 2003). PROTAN allows one using a procedure of classification for analyzing the content of a text. This procedure rests on semantic dictionaries, that is, lists of words that have been proved to assess a particular word meaning. Having selected a list of relevant words –such as a list of abstract words–, one compares all the words of the text to all the words of the list. A dictionary, in textual analysis, is no more than a list of words organized into categories, that is, words with a role in a hierarchy. When one applies a dictionary to a text, one looks for matches between a word in a dictionary and a word in a text. One shoves the text words into the categories, counts the number of word matches in each category and takes the percentage of the number of word matches.

The "REGRESSIVE IMAGERY DICTIONARY" contains 2,484 entries (29 categories of primordial thought and 7 categories of symbolic thought). The indicator of creativity is the difference between words tagged in symbolic content and words tagged in primordial content. The "need for affiliation" (*n*Aff) is part of the MOTIVE DICTIONARY, beside the "need for achievement" and the "need for power". Only the *n*Aff (777 entries) interests us here. Intimacy, friendship, and positive emotional ties with a person, as well as liking and wanting to be liked, define the "need for affiliation". A word of the dictionary assigned to a category cannot be present in another one except in its superordinate category.

Results

The indicator of creativity for *Psychological Review* (Figure 1) increases cubically over the 111 years of existence of the journal [R^2 = .61, $F(3, 107)$= 55.0, $p < .0001$]. For the same journal, *n*Aff increases too, but linearly [R^2 = .27, $F(1, 109)$=40.9, $p < .0001$]. In this and the remaining cases, autocorrelations –correlations between observations– have been removed using the SAS/AUTOREG procedure (Hogenraad, McKenzie, & Martindale, 1997). The correlation between *n*Aff and creativity for *Psychological Review* amounts to .28 (n = 111, $p < .01$). In the *Journal of Applied Psychology* (Figure 2), both creativity and *n*Aff (r = .32, n = 88, $p < .01$) increase linearly, [R^2 = .09, $F(1, 86)$ = 8.3, $p < .01$] for creativity, and [R^2 = .65, F(1, 86) = 163.1, p < .0001] for *n*Aff.

Insert Figures 1 and 2 about here

In *Relations Industrielles/ Industrial Relations* (Figure 3), creativity follows a negative trend [R^2 = .12, $F(1, 48)$ = 6.3, $p < .05$] while the course of *n*Aff is not significant [R^2 = .07, $F(1, 48)$ = 3.8, $p < .10$]. The correlation between creative and *n*Aff is .34, n = 50, $p < .05$.

Insert Figure 3 about here

In summary, creativity and need for affiliation follow a positive course in two cases, *Psychological Review* and *Journal of Applied Psychology*. The course of creativity is negative in the other journals. That of the need for affiliation is still positive in *British Journal of Industrial Relations*, *Harvard Business Review*, and *Empirical Studies of the Arts*, but

negative in criminology and most industrial relations journals. What happens in the latter journals is precisely the individualism exposed by Sorokin (1985), and specifically by Piore (1995). The following is a summary of the results:

	*n*Aff +	*n*Aff -
creativity+	*Psych. Rev.*	
	J. Appl. Psychol.	
creativity -	*Brit. J. Industr. Rel*.	*Rel. Industr./ Industr. Rel.*
	Harvard B. Rev.	*Industr. Labor Rel. Rev.*
	Emp. Studies Arts	*J. Industr. Rel.*
		J. Crim. Law. Criminology

Applied social science: "Last one out switch off the light"?

> Motto on an East Berliner's T-shirt during the westward passage of the Berlin Wall in November 1989 (Stern, 1992, p. 290).

(1) In a perfect world, the connection between creativity and need for affiliation in works of science might be systematic. In reality, this association exists in only two journals (*Psychological Review* and *Journal of Applied Psychology*). This association confirms Sorokin's (1985) theory and observations about the connection between individualism and sensate

literature. That creativity and need for affiliation are declining or stagnant in the remaining journals reminds us of Schlesinger's (1999) comment that the intellectual effect of individualism is stagnation.

(2) What we see has all the appearances of a stagnation, and sometimes decline, of modeling in applied social sciences. Industrial relations, management sciences, criminology, prosper in their own intellectual cul-de-sacs and sensate words are doing all the work. These results confirm the findings of the earlier studies described at the beginning of this chapter. With variations of detail, the data updated to 2004 (*Psychological Review*, *Journal of Applied Psychology*, *Industrial and Labor Relations Review*, and *Empirical Studies of the Arts*) show little change compared to the former analyses. Meanwhile science-minded disciplines (experimental psychologies) show an increase of conceptual thought. Martindale (1990, chapter 10) analyzed excerpts for every fifth year of the *American Journal of Psychology* (1887-1987), *Psychological Review* (1895-1985), and the *Journal of the Experimental Analysis of Behavior* (1958-1986). His results are similar to those got here from the analysis of the titles of *Psychological Review*.

And yet, there is perhaps no need for anyone in applied social science to desert the field and ask the last one out to switch off the light. In his commentary of Gustave Flaubert's (1993) "*L'éducation sentimentale*", David Trotter argues that Flaubert had "set aside the doctrine of psychological determinism (...) to emphasize the part played (...) by chance and by 'external facts'" (2000, p. 115). In Martindale's model of artistic

change (1990), a night journey account is when a character returns purified after having overcome a series of trials. Flaubert's "*L'éducation sentimentale*" could not be a night journey account (Hogenraad, 2002). Flaubert's novel and its main character Frédéric are too much under the force of circumstances (chance meetings in crowded places, being involved with different kinds of women). Our ability to predict often depends on being able to ignore smaller effects, if there are not too many of them. That gives us something to think about. Applied social science too is much under the force of external events: unemployment and economic crises for industrial relations, death penalty and pressure of public opinion for criminology. One expects war to alter the course of applied social science, not of experimental psychology. Fate, not psychology, is the motive behind these events. Pressure toward novelty is hamstrung, while pressure from outside is at work to solve problems at the expense of science building and at the risk of deskilling scientists (Reich, 1991).

(3) A science under pressure for novelty and open to happy accidental discoveries is the most helpful antidote to commercializing science and higher education. That creativity and morals connect only in science-minded disciplines (as opposed to problem-solving ones) is a good enough reason to preserve a core academic role for disinterested research. It is also the answer to the oft-heard jeremiad from business people, "science for what?" (and do they love that question!). Besides, connecting creativity with morals may make you see a work of social science with new eyes when you next meet one.

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Table 1. Statistical summary of the titles corpus

Journal	Years	Number of words	Number of different words
Psychological Review	111 (1894-2004) (updated)	30,832	4,808
Journal of Applied Psychology	88 (1917-2004) (updated)	72,551	7,167
Harvard Business Review	72 (1922-1994)	25,786	4,566
Industrial and Labor Relations Review	57 (1947-2004) (updated)	14,926	2,680
Industrial Relations	33 (1962-1995)	6,474	1,553
British Journal of Industrial Relations	33 (1963-1995)	7,309	1,568
Journal of Industrial Relations	37 (1959-1995)	7,439	1,660
Relations Industrielles / Industrial Relations	50 (1946-1995)	9,629	1,976
Journal of Criminal Law and Criminology	81 (1910-1990)	11,693	3,334
Empirical Studies of the Arts	21 (1983-2003) (updated)	2,598	993
Total		777,131	

Figure captions

Figure 1. Creativity and need for affiliation in 111 years of *Psychological Review* (1894-2004) – smoothed data.

Figure 2. Creativity and need for affiliation in 88 years of the *Journal of Applied Psychology* (1917-2004) – smoothed data.

Figure 3. Creativity and need for affiliation in 50 years of *Relations Industrielles/ Industrial Relations* (1946-1995) – smoothed data.

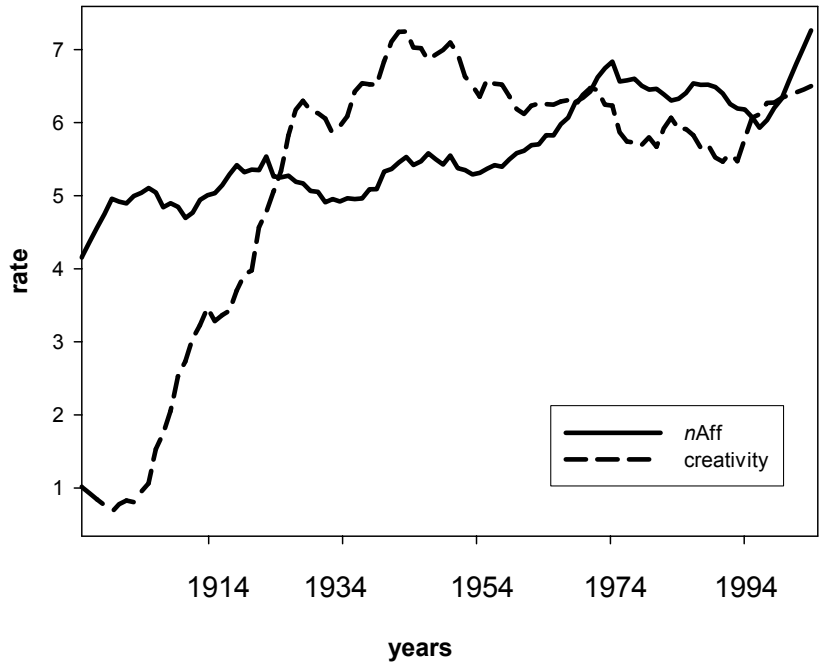

Figure 1. Creativity and need for affiliation in 111 years of *Psychological Review* (1894-2004) – smoothed data.

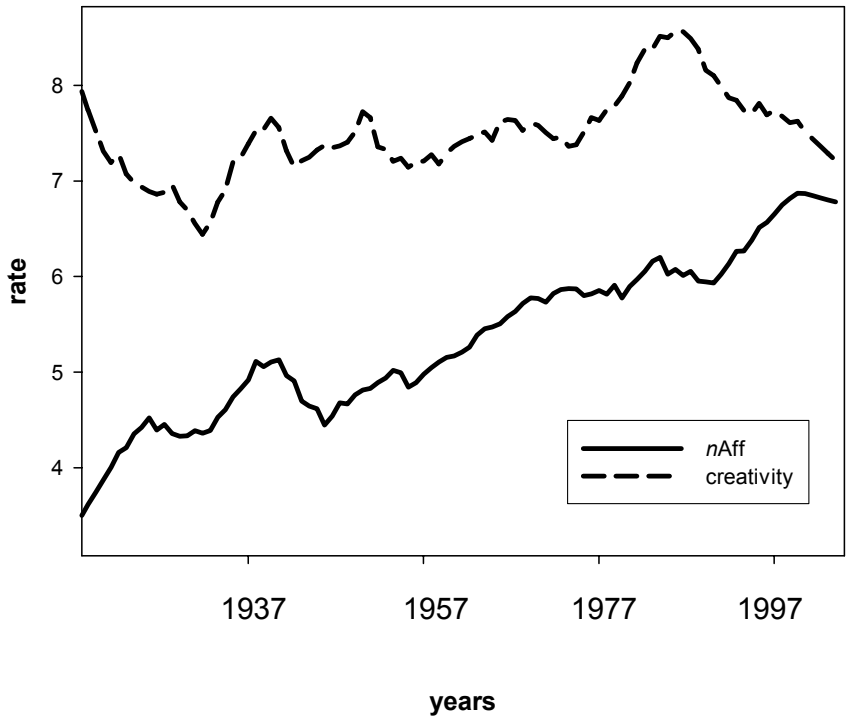

Figure 2. Creativity and need for affiliation in 88 years of the *Journal of Applied Psychology* (1917-2004) – smoothed data.

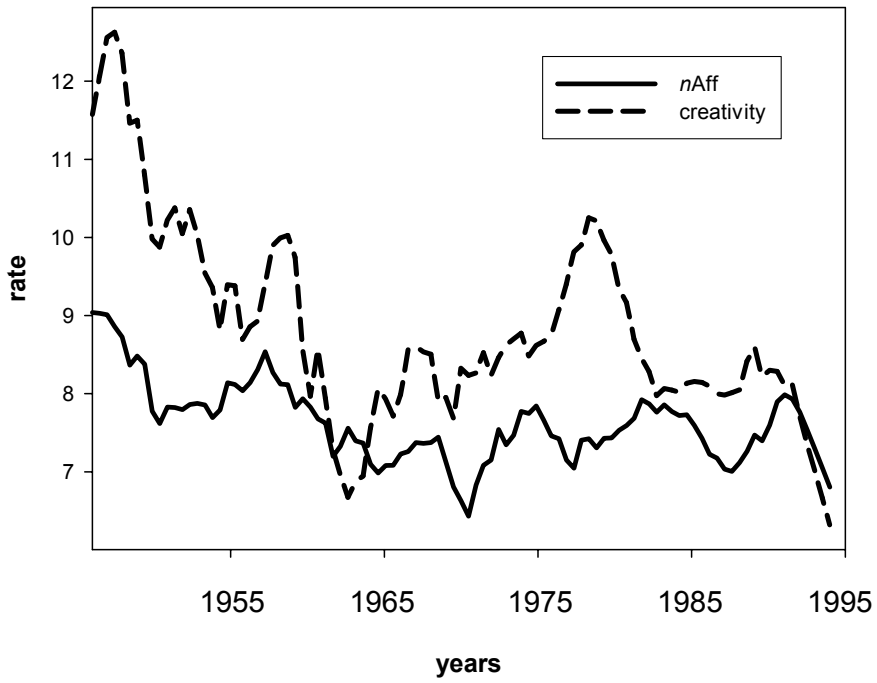

Figure 3. Creativity and need for affiliation in 50 years of *Relations Industrielles/ Industrial Relations* (1946-1995) – smoothed data.