

CONCENTRATED OR DILUTED:
HOW DO WE PREFER OUR CANDIDATES?

by

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Abstract

The dilution effect is the diminution of evaluations of a list of high-quality items resulting from the addition of mediocre- or low-quality items to the list. Forty experienced members of academic promotion and tenure committees rated the qualifications of a candidate for tenure. A random half got a “concentrated” list of five top-tier publications; the remaining participants got a list of the same five top-tier articles “diluted” with an additional three lower-tier articles. The concentrated list evoked higher ratings of quality and the diluted list evoked higher quantity ratings. The diluted list also evoked more positive ratings of productivity, higher ratings of this candidate compared to recent candidates in the respondents’ departments, and higher ratings of the candidate’s likelihood of getting tenure. Respondents in both conditions espoused that quality is more important than quantity; however, this did not affect their tendency to vote for or against tenure. The results are discussed in terms of diminishing marginal utility theory and implications for practical application are suggested.

Concentrated or Diluted:

How Do We Prefer Our Candidates?

Does adding several mediocre articles to a concentrated list of several high-quality articles in a CV dilute the value of the individual's overall contribution in the eyes of senior colleagues? If so, we speak of the "dilution effect." In an article entitled "When more is less," Hayes (1983) reported on how psychologists rated the quality and quantity of colleagues' publications in the Spring of 1980. In his experiment, he elicited clinical and experimental psychologists' ratings of lists of publications. Participants received a "condensed publication section" from a CV in their area and a four-item questionnaire. Each CV contained a list of the number of articles published over the previous three years and the journals in which they had appeared. Because titles of articles could raise complex issues other than quality per se, Hayes included no article titles. He manipulated quality, the number of "high-quality" and "low-quality" articles published and quantity, the total number of articles published. He used perceived prestige of the journal to manipulate apparent quality based on recent ratings of psychology journals by a random sample of members of the American Psychological Association (Koulack & Keselman, 1975; there were no impact-factor ratings then). Three high-prestige journals were selected from those rated in the top 10 of the relevant area at the time (e.g., the *Journal of Experimental Psychology: General* for experimental psychology, and the *Journal of Abnormal Psychology* for clinical psychology). Three journals rated much lower were also presented in each area. Hayes produced three levels of publication quantity: one article per year (three total), three articles per year (nine total), and six articles per year (18 total). Within each quantity level, he manipulated the ratio of high- and low-quality publications. For low-quantity CVs, there were either none, 1, 2, or 3 high-quality publications. For medium-quantity CVs,

either none, 1, 2, 3, 6, or 9 high-quality articles were listed. For high- quantity CVs, the number of high-quality articles was either none, 1, 2, 3, 6, 12, or 18. Hayes mailed 28 CVs for each cell along with a questionnaire that asked the participants to rate the psychologist's overall competence, total research contribution, skill as a researcher, and their interest in having this psychologist interview for a job in their department if one were available.

Analysis of variance revealed that increasing numbers of low-quality articles increased the average ratings only for CVs with few high-quality publications. For those with two or three high-quality publications, more low-quality articles either added nothing or actually reduced the ratings. Further analysis revealed that the strongest and most consistent determinant of respondent ratings was the percentage of high-quality articles. If the percentage of high-quality articles was maintained, increased quantity raised the ratings. However, when increased quantity came at the expense of the percentage of high-quality articles, the ratings dropped. For example, three high-quality articles alone were rated higher than the same three high-quality articles plus six articles in mediocre journals; this was the source of Hayes' title, "When More Is Less."

Hayes concluded that psychologists do not integrate publication information in CVs additively; rather, when processing the information in CVs, the perceived whole is sometimes less than the sum of the parts. Quantity enhances evaluation only beyond a certain quality threshold; adding more articles of mediocre quality to a record of high quality actually detracts from its overall evaluation. Thus, under certain circumstances, more is less; diluting a list by adding low-quality articles to a number of high-quality articles may diminish the list's overall rating.

The theoretical issue involved concerns cognitive judgments. Nisbett, Zukier, & Lemley (1981) studied the effects of adding "nondiagnostic" information (i.e., information judged not to

be useful in predicting some outcome) to “diagnostic” information (i.e., information judged to be useful in predicting some outcome). Adding the nondiagnostic information affected outcome predictions in a manner that diminished the weight of the diagnostic information in the judgments that the participants made. Nisbett et al. labeled this diminution the *dilution effect*. Nisbett et al.’s operationalization of dilution is only partially relevant to the present research question. The “diluting” information in their line of research was not relevant (i.e., it was “nondiagnostic”) to the judgment at hand, whereas in the case of lower-quality articles added to a list the additional information that they provide is hardly “nondiagnostic.”

More directly relevant to the present research question is a converging line of research in which Liberman and Ross (2006) studied banding of channel offerings in pay-TV services. Adding non-favored channels to a pay-TV package of favored channels resulted in lower consumer interest. Subtracting non-favored channels from a mixed package resulted in greater consumer interest, even when the price remained unchanged. In Liberman and Ross’ experiment, the point is not just that the low-valued items added count for less; rather, adding less valued items *decreased the value of the whole package*. They showed that removing the less-desirable channels increased the value of the bundle; hence the subtitle of their article, “When less is more.” Their less-desirable channels parallel the lower-quality articles in the present context. Recast in terms of the present issue, the question becomes, Does adding B-level publications to a collection of top-tier publications reduce the value of the total publication record? If so, then there is a dilution effect.

Dilution constitutes an interesting anomaly. The dilution hypothesis states that $(A + B) < A$ where A represents the several high-quality articles and B represents the several lower-quality

articles. But for this to be true, B must be negative. If B is negative, then it means that adding second-tier publications detracts. This is the meaning of “more is less.”

The practical upshot of dilution is especially crucial for young scholars seeking tenure. If dilution occurs, they should publish more articles only if they are of high quality; once one has some top-tier publications, adding mediocre publications will only detract from (i.e., dilute) the overall rating. Accumulating more mediocre publications may be a self-defeating way to gain promotion; fewer high-quality articles may be more likely to evoke favorable evaluations.

To the best of my knowledge, these results have never been replicated among scholars in the fields of industrial and organizational psychology, organizational behavior, or management. Inasmuch as Hayes found some differences between clinical and experimental psychologists, we can expect industrial and organizational psychologists to be different from other psychologists. Furthermore, much has changed in the more than quarter century that has passed since Hayes' gathered his data. Therefore, the present experiment was undertaken to replicate Hayes' study, with several design differences, among organizational-behavior and management scholars.

Evaluation of scholars at all ranks is important in academia. However, it is especially crucial with regard to young scholars seeking employment and for candidates for tenure. To make the research more relevant to hiring and promotion-and-tenure decisions, the stimulus materials were devised as the publication list of a young scholar with a history seeking employment. The dilution hypothesis was that here, too, more is less. Specifically, the predictions were that adding low-quality articles to a CV with several high-quality articles will dilute the overall evaluation of the quality of the candidate's work. Furthermore, this dilution will reduce his or her tenure worthiness.

Method

Design, Population, and Sample

The present experiment was a true experiment among senior university faculty members who have served on committees that make hiring, promotion, tenure decisions, and have written letters of recommendation to such committees. A random half got the concentrated list and the other half got the diluted list. They were informed that this was an experiment about how we make tenure decisions. They may have surmised that different individuals were getting different versions of the questionnaire. However, each saw only his or her questionnaire. They were not informed of what different participants got or of the purpose of the experiment until after the data collection.

The population was all active and inactive members of the Society for (Research on) Organizational Behavior (SOB). In the Fall of 2008 they numbered 93. The present author is a member. The remaining 92 members were divided randomly into two groups of 46. One group got the concentrated version of the questionnaire and the other group got the diluted version. About 50 members are defined as active, meaning that they attend the annual SOB meeting at least twice every five years. Assuming they are the individuals most likely to respond to the present questionnaire, the 40 that responded are about 80 percent of the likely respondents.

Questionnaire

One version of the questionnaire presented a concentrated list of publications and the other one presented a diluted list. In both versions the instructions were:

This is an experimental study of how we evaluate candidates for tenure, as when we serve on promotion and tenure (P&T) committees. You will be asked to peruse a fictitious candidate's list of publications and then to rate that candidate's promotability using the

20-item Tenure Candidate Rating Form. It shouldn't take more than 10 minutes or so to complete it. The questionnaire is anonymous; there is no research need to know who you are. You are asked whether you have served on P&T committees and what your primary affiliation is (psychology, business, or other). This information is for comparative analysis and will not be used for any undisclosed, nefarious purpose (e.g., to identify you).

This was followed by this description of the "candidate":

Assistant Professor Dale Bailey is a candidate for tenure at a reputable research university, such as your own. Dr. Bailey completed a doctoral degree in I-O psychology at a high-ranking department in 2002. The following list of publications is from Dr. Bailey's CV. Please peruse the list and evaluate Dr. Bailey's competence and suitability for promotion to the tenured rank of associate professor using the Tenure Candidate Rating Form, which follows the list. Of course, in evaluating a real candidate you would have information regarding grants, teaching, contribution to administration, and citizenship, and you would have recommendations. For present purposes, please ignore these other important considerations and focus only on Dr. Bailey's publication record.

The name Dale Bailey was chosen to be gender-neuter, nondescript, and ethnically ambiguous.

The same twenty questions followed this description regardless which version the participant got, concentrated or diluted (see Appendix A).

Experimental Treatment

To operationalize dilution versus concentration, participants received one of two lists of publications. The lists were comprised of articles with contrived titles in a variety of management and organizational-behavior journals. Each journal's current (Fall, 2007) Institute

for Scientific Information's Impact Factor (IF) was indicated. The diluted list was longer but of mixed journal quality. Table 1 shows the journals that were in each list. The concentrated list included only five articles, but they were all in top-tier journals with a mean Impact Factor (IF) of 3.29. (There is wide consensus among organizational behavior researchers that *Organizational Behavior and Human Decision Processes* is top-tier despite its relatively low IF; without *Organizational Behavior and Human Decision Processes* the mean IF of the remaining journals in the concentrated list is 3.74.) The diluted list had three more articles, but each additional article is in a journal that had an IF of less than 1.00, reducing the mean IF of all eight articles to only 2.30. Thus, the diluted list is both appreciably longer and appreciably inferior in *average* quality, though it includes all the high-quality articles in the concentrated list. Preferring the diluted list would be akin to rewarding quantity whereas preferring the concentrated list would be tantamount to exacting a penalty for an additional quantity of inferior quality (i.e., more is less). Based on the dilution hypothesis, the present prediction was that participants would favor the concentrated list.

Insert Table 1 about here

Measures

Questions 1 through 16 comprise the evaluation items (see Appendix A). The remaining four items tap aspects of how the respondents arrived at their responses, at least so far as they were aware. Questions 10 and 16 operationalize the dependent variable, namely, whether the respondent would support and vote for this candidate. The remaining questions deal with how

the respondent evaluates various aspects of the candidate's work and how the respondent thinks he or she based his or her ratings.

Procedure

SOB members received an email inviting them to participate in the experiment approximately three weeks before the fall, 2007 meeting. The email included a description of the study without divulging its true purpose, a promise to debrief them at the upcoming meeting, and a link to the online questionnaire. Two reminders were sent to nonrespondents. Forty members responded before the meeting. At the meeting, four more members completed paper-and-pencil versions of the questionnaire, bringing the total to 44. Then, in a presentation at the meeting, the author presented the purposes of the experiment, revealed its hypotheses and method, debriefed and thanked the respondents, and sought feedback about the experiment.

Means for the two conditions were compared using one-tailed t tests when there was a directional hypothesis. Effect sizes were computed in terms of r and the binomial effect size display (BESD).

Results

Impact of Dilution on Quantity and Quality Ratings

The first two rows of Table 2 show that respondents rated the diluted list to be of significantly greater quantity and the concentrated list to be of significantly higher quality, as expected. The effect size for the difference in quantity ratings is $r = .43$. The BESD equivalent is that 71.5% of those who got the diluted list rated the quantity above the median whereas only 28.5% of those who got the concentrated list rated it above median in quantity. The effect size for the difference in quality is $r = .30$; the BESD equivalent is 65% versus 35%. Thus, the effects of dilution on quality and quantity were appreciable, as predicted; those that got the diluted list

were about twice as likely to rate it high in quantity but only about as likely to give it a high quality rating. Each participant saw and responded to only one list. Therefore, they rendered their ratings in absolute terms, not relative terms; otherwise, comparing their means would not be meaningful.

The significant mean difference in quantity is not remarkable; that respondents rate a longer list as having greater quantity is trivial and tests no hypothesis. However, significantly lower quality ratings for the longer list, which includes all the high-quality articles as the shorter list plus three additional articles, is not trivial. It demonstrates the dilution effect and supports the hypothesis that dilution diminishes quality ratings. Evidently, the respondents weighed the quality of the candidates' published work by averaging—not by summing—across articles. Furthermore, the size of this dilution effect is nontrivial.

Insert Table 2 about here

Effects of Dilution on Preference of Candidates

Row 3 in Table 2 show that the diluted list evoked significantly higher ratings of productivity. This is suggestive of a tendency to judge productivity more in terms of quantity than in terms of quality. Perhaps by adding low quality publications to their records, young scholars increase seniors' impressions of their productivity. Row 4 shows no dilution effect on ratings of competence.

Row 5 in Table 2 shows a difference that was large enough to reach statistical significance using a bi-directional test ($p < .05$, two-tailed test). Contrary to the dilution prediction, respondents that rated the diluted list deemed the candidate to be more likely to “get

tenure in your department” than did those that rated the concentrated list. The next three rows show that the treatment did not affected ratings of the candidate’s growth potential, his or her likelihood of eventually attaining the rank of full professor, or how much grant money the respondents would give him or her.

The diluted list elicited higher ratings of the present candidate compared to “recent candidates for tenure in your department.” With no directional hypothesis for this variable, a one-tail test is appropriate; it is a bit shy of significance. However, the direction of the nonsignificant difference suggests that the candidate with the diluted list may be more similar to recent candidates in the respondents’ departments than the one with the concentrated list.

And Your Decision Is . . .

The last line in Table 2 shows a nonsignificant tendency to recommend the candidate with the diluted record. Analysis of the answers to the direct question, “Would you vote for or against tenure for Dr. Bailey?” is displayed in Table 3. It shows that there was no significant difference in preference for the two candidates. Most of the participants voted for whichever list they got. The slightly smaller proportion voting for the diluted list was not statistically significant. There is little support in these data for the effect of dilution on preference for candidates.

Insert Table 3 about here

Actual Versus Professed Preferences

Respondents rated the importance to them of the quality and quantity of a candidate’s publication record when judging promotability. Comparing the columns in Table 4 reveals no

differences between participants in the two conditions in the degree of importance they say they give to quantity and quality; no differences were expected. Comparing the rows of Table 4 shows that participants in both conditions rated quality more important than quantity and by about the same amount. This is not a surprising finding. However, it stands in contradiction to the actual choices these participants made; they did not choose the candidate whose record they rated as being of higher quality over the one with extra quantity.

Insert Table 4 about here

Impact of Departmental Affiliation

Thirty respondents were affiliated with business schools and 13 with psychology departments (one left this item blank). Affiliation made a slight difference. Business professors rated the quantity of both lists significantly higher than did psychology professors, 1.94 vs. 1.33 for the concentrated list and 2.71 vs. 2.14 for the diluted list, respectively, $2.71 F(1, 39) = 5.53$, $p < .05$. Evidently, it takes a larger number of publications to influence the subjective quantitative perceptions of psychology professors than of business professors. This may mean that psychology professors are more stringent in judging quantity than are their business counterparts, or that the former expect to see candidates with longer publication lists than the latter. The only other psychology-business difference detected was how much gross pay the candidate should get in your department. Business pay far exceeded pay in psychology departments, 7.70 vs. 4.36, $F(1,34) = 21.40$, $p < .01$. This measure is not scaled to dollars, but the result fits with what we know: in the United States salaries are much higher in business schools than in psychology departments.

Discussion

How do you prefer your porridge, thick in a cup or thinner in a larger bowl? Adding several mediocre publications to the list did reduce quality ratings, as predicted. This confirms the dilution effect. The statistically significant differences indicated that the respondents thought the candidate with the diluted CV was more productive and would be more likely to get tenure in their departments. This was backed by the nonsignificant result indicating that the respondents themselves might support such a preference. However, dilution did not affect their responses to the measure that was closest to actual tenure decisions, that is, the terse, dichotomous question, “Would you vote for or against tenure for Dr. Bailey?”

A rival explanation for the participants’ voting preferences could be that they perceived the diluted list to be of as good quality as the concentrated list. However, the results in Table 2, showing that the participants in the diluted condition rated the candidate significantly lower in quality than did their counterparts in the control condition, rule out this explanation. The manipulation check shows that the participants that got the diluted list did render lower quality ratings, despite the fact that the same five high-quality articles appeared in the list they rated. Clearly, then these participants did not choose quality over quantity in making their crucial tenure decision.

Limitations

Thresholds. The impact of dilution on choice of candidates may only occur when the concentrated list reaches a threshold length. Perhaps the present length of only five top-tier publications was insufficient to impress the respondents that this candidate was an outstanding young scholar. It may require a concentrated list of, say, ten top-tier publications in contrast to a

diluted list of these ten plus another five or so low-tier publications to evoke preference for the concentrated list.

External validity. It is not certain how closely respondents' answers to the questionnaire reflect what they would think and do in an actual promotion decision. Like Hayes' participants, some of the present participants registered their protest that they would never evaluate a candidate based solely on such information as we gave them. Several respondents voiced concern at being asked to judge a candidate's credentials without being able to get more details about the candidate, read the articles, and review "the whole package." They also would look for features of a coherent stream of research that a young scholar was—or was not—developing. Furthermore, some would have wanted to see citation information as a gauge of impact. The present study was more a laboratory experiment than a field experiment. The procedure that elicited participants' responses was quite artificial. Real careers were not at stake. In short, the method did not closely simulate reality and therefore the study may have limited practical validity. This built-in design limitation restricts our certainty in knowing whether the dilution effect occurs in actual situations.

The members of SOB are not a representative sample of members of promotion-and-tenure committees at large. This further limits the external validity of the present experiment. It would be worthwhile to replicate it in samples of other populations of scholars, such as the members of the Society for Industrial and Organizational Psychology or the Academy of Management. Members of these professional associations also would not represent the population of members of the relevant promotion-and-tenure committees, but they would be much closer to that ideal than the present sample.

Furthermore regarding the sample, it was barely minimal in size for a preliminary study. Needed is replication among larger populations such as the memberships listed above.

Future Research

The lists used in the present experiment were apparently too short. Neither list evoked a mean rating that reached the midpoint on the scale asking the respondents to compare this candidate to “recent candidates for tenure in your department.” This likely limited the variance on other measures. Future replication should try longer lists.

Though some of the above interpretations are in terms of preferences, this may not be the proper way to interpret between-subjects data. Because each participant responded to one list only, the analysis made the comparison, not the participants. A within-subjects design, in which each participant would rate two lists, one concentrated and one diluted, may yield different results, and it may simulate more closely how promotion-and-tenure committee members make their decisions. They often have more than one candidate to evaluate in one sitting, and they are often encouraged to judge the present candidate relative to others known to them in a similar stage of their careers. An ambitious replication experiment might use longer lists and contrast the results obtained in within-subjects and between-subjects designs.

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Table 1

Journals and Their Impact Factors in the Concentrated and Diluted Publication Lists

Concentrated		Diluted	
Journal	IF*	Journal	IF*
<i>JPSP</i>	4.223	<i>G&OM</i>	0.846
<i>OBHDP</i>	1.514	<i>JPSP</i>	4.223
<i>AMR</i>	4.515	<i>OBHDP</i>	1.514
<i>AMJ</i>	3.353	<i>AMR</i>	4.515
<i>JAP</i>	2.851	<i>IJP</i>	0.571
		<i>AMJ</i>	3.353
		<i>JASP</i>	0.566
		<i>JAP</i>	2.851
Total	16.456	Total	18.428
Mean	3.291	Mean	2.304

*Institute for Scientific Information's Impact Factor (IF)

Note. JPSP is Journal of Personality and Social Psychology; OBHDP is Organizational Behavior and Human Decision Processes; AMR is Academy of Management Review; AMJ is Academy of Management Journal; JAP is Journal of Applied Psychology; G&OM is Group and Organization Management; IJP is International Journal of Psychology; JASP is Journal of Applied Social Psychology.

Table 2

Effects of Dilution on Ratings

Response	Concentrated		Diluted		<i>t</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Quantity rating	1.77	0.81	2.50	0.74	3.10**
Quality rating	3.55	1.10	3.00	0.62	2.03*
Productivity	2.59	0.91	3.00	0.69	1.68*
Competence	3.32	0.65	3.09	0.68	1.13
Likely get tenure	2.36	1.29	3.18	1.30	2.10* ^a
Potential for growth ^b	2.86	1.12	2.52	0.75	1.16
Attain full professor	3.27	0.83	3.23	1.00	0.16
How much grant? ^c	2.15	1.14	1.75	0.85	1.26
Compare to recent	1.68	1.00	2.27	1.03	1.93
You recommend tenure	3.27	0.94	3.73	1.12	1.46

Note. Unless noted otherwise, $n = 22$ concentrated and 22 diluted.

^atwo-tailed test.

^b $n = 22$ concentrated and 21 diluted.

^c $n = 20$ concentrated and 20 diluted.

* $p = .05$, one-tailed. ** $p < .01$, one-tailed.

Table 3

Dilution and Vote

Vote	C	D	Total
For	14	18	32
Against	8	4	12
Total	22	22	44

Note. Fisher's Exact Test: $p = .31$, two-tail. Chi square = 1.83, ns.

Table 4

Espoused Importance of Quality and Quantity

Response	Concentrated		Diluted		<i>t</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Quantity important	3.45	0.67	3.57	0.68	0.57
Quality important	4.59	0.50	4.33	0.97	1.09

Note. $n = 22$ concentrated and 21 diluted.

Appendix A

1. All in all, how would you rate Dr. Bailey's scholarly productivity?
2. All in all, how would you rate Dr. Bailey's research competence?
3. How would you rate the *quantity* of Dr. Bailey's published work?
4. How would you rate the *quality* of Dr. Bailey's published work?
5. How does Dr. Bailey compare to recent candidates for tenure in your department?
6. How likely is it that Dr. Bailey would get tenure in your department?
7. How would you rate Dr. Bailey's potential for academic growth?
8. If Dr. Bailey gets tenure now, how many years do you think will pass till the next promotion?
9. How likely is it that Dr. Bailey will eventually attain the rank of full professor?
10. Would *you* recommend Dr. Bailey for tenure in your department?
11. Other considerations aside (e.g., personality), how likely would you be to choose Dr. Bailey as a research collaborator?
12. You have an hour free lunchtime tomorrow. Would you invite Dale to lunch to exchange ideas about research?
13. Dr. Bailey is recommending a colleague from another university for consideration as a new faculty member in your department. How much weight would you give this recommendation?
14. You administer \$1,000,000 in research money in your department. Assuming a competent proposal, how much of it would you grant to Dr. Bailey?
15. How much gross pay (12 months, including summer funding) should Dr. Bailey get in your department?

16. If you were on the P&T committee making the decision in your department, would you vote for or against tenure for Dr. Bailey?
17. How important is the quality of a candidate's publications in your judgments about promotability?
18. How important is the quantity of a candidate's publications in your judgments about promotability?
19. Are you now, or have you ever been, a member of a Promotion and Tenure Committee?
20. Is your primary academic affiliation with a psychology department or a business school?