His knowledge of various work in anthropology, and animal research concerning dietary conditioning, contributed to the birth of his ideas and the methodology for testing them. His university position, with tenure, provided support and a certain degree of liberty.

In conclusion, it seems worthwhile to distinguish two kinds of self-experiments in Roberts' article. First, there are self-experiments in which a person tries different treatments, and varies more or less systematically the conditions to observe potential effects. Second, there are naturally occurring self-experiments, such as the change of beverages in Paris. These natural experiments happen all of the time. Most people do not notice the potential information offered by these "experiments," which may be a result of "chance" events. Being in the self-experimental frame of mind helps one to notice, to analyze these natural experiments, and to make good use of them. As Pasteur once said, "chance favors the prepared mind." Is it possible that self-experimentation serves creative thinking, in particular, because it leads a person to see the world in terms of a particular project, and to pursue this project actively or passively over a long period of time?

Self-experimentation as science

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Abstract: Examination of the target article for its relevance to the analysis of private behavior leads to three concerns: the absence of a new methodology for studying private behavior, the undisclosed possibility of interactions, and insufficient attention to the social context of idea generation. Regardless of these concerns, a larger issue remains: Can a science of $n = 1$ be credible?

Kudos to *BBS* for publishing a target article at once offbeat and provocative, and to its author for estimable perseverance. His decade-long efforts to solve the personal problems of early awakening and weight loss are ingratiating as is his canny ability to invoke references to the Amish, astronauts, sushi, and tenure, for example, without once mentioning serendipity (except in his references).

It is not readily apparent how the target article should be classified. Is it evolutionary psychology? Applied psychology? Learning? Motivation? Or does it belong to the philosophy of science? Roberts' report drew me initially by its potential to illuminate a longstanding lacuna in the experimental analysis of behavior, namely, the analysis of covert (also termed "private") behavior. B. F. Skinner's recognition of overt and covert categories of behavior (and the further categories of respondent and operant behavior) placed them in functional relationships with the categories of overt and covert environments. Skinner averred that experimental analysis would ultimately reveal causal links between covert behavior and the overt environment. In that linkage, covert behavior and overt behavior were likely to be correlated at best, and not form the causal relationship that is intuitively appealing. The issue of how to access private behavior for the purpose of measurement and thereby functional analysis was left open and remains underexplored.

Self-experimentation of the sort Roberts exemplifies and extols is tantamount to a science of $n = 1$. The researcher and his (in this case) subject are the same person. Psychologists will recognize the precedent established by Ebbinghaus; Roberts cites others as well. Like Ebbinghaus' interest in improving his memory, Roberts' interest was personally practical. Whether Roberts' two-cycle model of mood or his Pavlovian model of the set point for body weight will match the canonical status of Ebbinghaus' model of serial memory remains to be seen. What drew my interest was his assertion that the models were evidence of the particular efficacy of self-experimentation for the generation of ideas. Having ideas is private behavior.

My reading of the target article as a contribution to the experimental analysis of private behavior produced three concerns. The first is that Roberts produced no methodological breakthroughs in measuring the private events that were his desire for sleep, his restedness, his mood, his hunger, et cetera. He also utilized the A-B-A reversal designs familiar to experimental analysts, though never formally stating the stability criterion he invoked in moving from one condition to the next. Still, the extraordinary longitude of his data-gathering and its meticulous detail inspire awe. Together with clever procedures for presenting lights and faces, for recording wakefulness, and for instituting a lifestyle dominated by standing, not to mention a stoical submissiveness to flavor-impaired fare, they may even constitute heroic achievement.

The second concern pertains to Roberts' apparent neglect of the possibilities for interaction between the consecutive phases of his research. This is surprising, given his admirable alertness to the possible confounds posed by expectation and his care in dismissing them. Though his experimental designs began with a baseline condition, there was never any chance to return to a condition sans the cumulative effects of earlier conditions. For example, is it possible that the striking effects of fructose water on appetite suppression and weight loss were, at least indirectly, due to the effects of his earlier dietary experiments or, more remotely, to the fact that much of the waking day was spent on his feet and that he was sleeping soundly?

The inherently social context of the generation of ideas is my final concern. Several of the author's examples begin with parenthetical reference to a friend's comment or to some other incidental observation. An idea follows that soon takes on a life of its own and predicates the ensuing experimental series. The fact that the author lives alone and can configure his home life as he will, seems a distinct boon to the success of his experimentation. His considerable freedom to style his professional life in ways conducive to the research lends further advantage. In my opinion, he has given too little attention to these factors. Nor does he adequately acknowledge his reliance on friends and other associates who can be assumed to share his interests and on whom he is reliant for nascent ideas – and, I suspect, for ongoing support and encouragement of his work, if only casually. It is also important to remember his reliance on the published work of other scientists whom he readily credits.

These concerns are not meant to fault the author's exuberance or the promise of the kind of science he represents. Instead, they point up the possibility that self-experimentation is more complicated and less solitary than it might appear. It may also be more insular. The author's confidence that what he discovered on his own about himself will generalize to others has three bases: shared biology, commonality of incidence and cause, and interspecific convergence. Whether generality will be achieved remains to be seen. The economy of scale that, for the author, underlies the potent efficiency of self-experimentation may also constrain its generality. Consistent with my concerns, the weight of nuance may ultimately prevent sucrose water from capturing the market from Atkins and others.

Should failure of generality detract from self-experimentation? Can there be a science of $n = 1$? If the research is resolutely performed in the interest of hypotheses, and painstakingly adheres to the conventions of design, analysis, and peer-review, can it be acceptable if its findings invariably apply only to the behavior of the single subject who happens to live within the same skin as the experimenter? Does that suffice as science? Or does science require that specific findings always be replicable in others? If so, can the credibility of self-experimentation as science consist in the generality of the method – that others will self-experiment with the same admirable fervor and rigor as Roberts and with comparably salutary results? Whatever the verdict, the author must be commended for carrying on in the spirit that Skinner (1976) celebrated in *Walden Two,* where the character named Rogers ex-

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claims, "I mean you've got to experiment, and *experiment with your own life*! Not just sit back – not just sit back in an ivory tower somewhere – as if your own life weren't all mixed up in it."

Can the process of experimentation lead to greater happiness?

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Abstract: We argue that the self-experimentation espoused by Roberts as a means of generating new ideas, particularly in the area of mood, may be confounded by the experimental procedure eliciting those affective changes. We further suggest that ideas might be better generated through contact with a broad range of people, rather than in isolation.

Roberts claims to have found a novel association between television watching and his affective state at a later time. Despite Roberts' excellent experimental method, we would like to offer an alternative perspective that suggests the change in affect might be attributable to the process of experimentation itself.

Research into human affect has produced one seemingly robust and intuitive relationship: unexpected, rather than expected, increases in personal wealth elicit the greatest positive changes in one's affective state. In the case of money, people who receive an unexpected windfall report greater levels of happiness for up to one year after the event (Gardner & Oswald 2001), and unexpectedly finding a dime on a vending machine also elicits an improvement in participants' positive mood (cf. Schwarz & Strack 1999). To generalise, one could imagine that an unexpected increase in any valued commodity, be it money, status, even knowledge, could have the same effect. We argue that ideas represent high-value items for Roberts and that their discovery may lead to his greater happiness, rather than watching television in and of itself.

Roberts places a high value on ideas, as evidenced in his paper's introduction. Therefore, it appears reasonable to assume that, for Roberts, ideas may be considered analogous to other high-value items such as money and, as with those who receive an unexpected windfall, one might imagine that the discovery of a potentially fruitful association, or idea, could also elicit feelings of happiness. Although there has been no specific research on how the scientific process might elicit affective changes in scientists, it would appear intuitive to make such a connection, one that might offer an alternative explanation of Roberts' findings. Although our line of reasoning, that scientific discovery may elicit happiness, rests primarily on intuition and an analogous relationship between ideas and money, there is some indirect evidence supporting this claim. When the King of Syracuse instructed the mathematician Archimedes to investigate the material his crown was made of, it was not until Archimedes stepped into his bath and discovered that his bulk displaced an equal volume of water that he believed he had found a means of addressing the King's request. Not only was this an important scientific discovery, but it has also become synonymous with the happiness scientific discovery can bring. However, and importantly, it was Archimedes' belief that he had found a solution to the King's problem that elicited his happiness; as he leapt from his bath, he had not formally tested his theory. Could the prospect of a "Eureka" moment also have elicited happiness for Roberts?

Roberts became aware of an increase in his positive feelings *before* seeking its cause. The only plausible event that might be associated with his elevated mood appeared to be his television viewing on the preceding day (for the sake of argument, we will assume this was a random fluctuation in mood). The hypothesis to be tested became the relationship between television viewing and happiness: If watching television does increase happiness then, "Eureka," a new scientific discovery. This process, however, creates an important issue specific to the process of self-experimentation: Roberts, the participant, must have been aware of the hypotheses and aware of the manipulations he subjected himself to, and the value of such a finding. In other words, his anticipation of an important discovery may have led to an increase in positive affect, which was then falsely attributed to television watching (a similar argument can be applied to that period where positive affect was diminished, during the evening following watching television on day one, where there should be, according to Roberts' expectations, no evidence for a discovery).

We argue that the fluctuations in Roberts' mood may have been in consequence of the experimental process he engaged in, which, to generalise, may lead to questions surrounding the place of self-experimentation more generally. Being both observer and participant, we suggest, led Roberts the scientist to infer that feelings elicited by engaging in the scientific process were attributable to Roberts the participant, a claim that may go beyond research in mood. Are there means of generating ideas that might be less open to confound? We now suggest that there is already an abundance of ideas and that seeking means of developing new ideas is unnecessary.

One option to generate ideas may be simply to talk to people (Simon & Kaplan 1989). Although some important work has been conducted in solitary (e.g., Descartes 1637/1931), one does not have to go too far before finding people in applied settings who have an abundance of ideas, generated through observing real world behaviour, that are eminently researchable, but who have neither the time nor the resources themselves to test these ideas. One area proving fruitful is research that uses a form of protocol analysis (Simon & Kaplan 1989) with criminal offenders (McMurran & Sellen, in preparation). For example, there has been no systematic study into the motivations behind habitual offenders' decision to stop offending and their motivation to lead crime-free lives. McMurran and Sellen have started to examine, through interviews with offenders themselves and with practitioners in the forensic setting, the reasons behind offenders' switching their behaviour. Although the qualitative data is wide-ranging and broad, it is already providing novel insights (ideas) as yet not addressed in the experimental literature and that will ultimately lead to future experimental work. An advantage of this approach over self-experimentation is that there is little involvement of the researchers in recognising and describing areas of inquiry, but it is still close to the real-world behaviours to be researched.

In sum, we argue that self-experimentation, in the area of mood, may be confounded by the experimental procedure. We further suggest that ideas might be better generated through contact with a broad range of people in an applied setting where there is a great need for research and an already established means of analysis.

Experimentation or observation? Of the self alone or the natural world?

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Abstract: One important lesson of Roberts' target article may be potentially obscured for some by the title's reference to "self-experimentation." At the core of this work, the key investigative resource is sustained and systematic observation, not experimentation, and it is deployed in a fashion not necessarily restricted to *self*-examination. There is an important reminder here of a strategically important, but neglected, relationship between observation and experiment.

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