Thinking About Your Theoretical Model

by Paul F. Tremblay
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Whether you are thinking about a model to develop in a Structural Equation Modeling course, an idea for a doctoral dissertation, or a research program for a grant application, you may find it valuable to break down the problem into phenomena and processes. At a simplified level, the phenomena that capture your interest are typically operationalized and investigated as variables, and the processes are the relations between these variables that are investigated with statistical procedures. In their book, *The Construction and Model-Building Skills*, Jaccard and Jacoby (2010) provide an extremely rich and comprehensive set of 26 heuristics for thinking about the phenomena and processes that will form a model or theory. In this article I summarize and use these heuristics by placing myself in the shoes of a researcher who is developing a model of Intrinsic Motivation.

1. **Analyzing your own experiences**. You probably have some access to the phenomenology or the "what it feels like" of the phenomenon of interest. For intrinsic motivation, I would think of situations where I have felt engaged, absorbed, or curious. What was I doing, what did it feel like, what led to that state, and how long did it last? Why was I so interested in that book on that specific day?

2. **Case studies**. The case study is a research method used in many disciplines. Here I would identify people I consider to be walking examples of intrinsic motivation. My particular challenge will be to ensure that the motive I am seeking is in fact intrinsic ("for the sheer joy of doing the activity") and not for money, to become famous, to impress, etc… I can think of a friend who has always been interested in intellectual pursuits for the sheer joy and satisfaction associated with curiosity and learning new things. Where does this interest come from? Perhaps, a good biography has been written about the person you have in mind.

3. **Experts' rules of thumb**. Here we would interview persons with high intrinsic motivation and ask them what they do to be intrinsically motivated. They may provide insights into generating ongoing interest and curiosity: "Do the things you love." And you might wonder "Where does this curiosity and interest come from"? This will get you started thinking about mechanisms, and as Jaccard and Jacoby point out, these insights may help develop a more formal theory.

4. **Role playing**. Can I mentally put myself in the place of someone who exemplifies intrinsic motivation? What is it like to feel interested and curious in what I am doing? Of course there are things that interest me but not to the point of spending several hours a day on those activities. Perhaps something in my environment matches and promotes my interest: perhaps my job, my work colleagues, my friend, my city.

5. **Thought experiment**. This activity is captured well by Jaccard and Jacoby: *…you think about relevant variables or scenarios and then think about the effects of different variations or manipulations of them, as if you were running an experiment—but instead*

doing all this in your head. You imagine the results and think about what implications they have for explaining your phenomenon. In other words, to understand fact, think fiction" (p. 50). I imagine a drug that could induce engagement in mathematics. I imagine an experiment in which I administer different levels of this drug to randomly assigned groups of teenagers and measure their behavior in class in a longitudinal design. How would their behavior change? Would they seek out more activities involving mathematics? Would they be happier? How would their other activities change?

6. **Participant observation**. At its most intense level, I could conduct ethnographic research by participating in the situations with the persons I am observing. I may join a group of local bird watchers and participate in their field trips to understand what feeds their passion. Or I could ride for a few days with the taxi driver who says he loves his job. I notice that he seems to enjoy the challenge of finding new routes to save time.

7. **Paradoxical incidents**. These are situations where you would observe the opposite of the behaviour you would have anticipated. Try to identify potential reasons for this paradox. I can imagine a personal example where I wake up one day and I lose my interest in books. This makes no sense because reading is my passion. This can be useful information if we try to identify instances where intrinsic motivation may be temporarily weakened by competing goals.

8. **Imaging**. Jaccard and Jacoby suggest to give your linguistic machine a rest and to just visualize the phenomenon of interest. Let's think of a movie that epitomizes intrinsic motivation. What is the person doing? I am reminded of a documentary of the Canadian rock group Rush where Geddy Lee was relating that after a long career, the group still loves to get together and just experiment with music and see what the Muses send their way. The scene moves to the three of them improvising with their instruments, just as engaged as if in front of an arena-sized crowd. Here I sense that intrinsic motivation involves some kind of creative interaction with one's environment, producing novel sounds, melodies, or rhythms and an interaction between one's abilities and the unknown creative process.

9. **Analogies and metaphors**. Using analogies involves "borrowing" from another problem area. Think of the computer analogy in cognitive science. When I was in the depth of my doctoral dissertation on academic motivation, I thought of the metaphor of electricity (voltage, amperage, and resistance) to explain properties of attention, effort, and persistence. At that point I began to understand motivation as a process. Metaphors can help us think about connections between concepts and underlying processes.

10. **Reframing as the opposite**. Let's see here if we can think about the opposite of intrinsic motivation. I am drawn first to lack of motivation or apathy, but I can go further to the extremity of dislike, repulsion, or disengagement. This heuristic can help clarify the concept of interest and delimit its content domain. I have always found thinking about the opposite challenging because I imagine an individual difference variable such as intrinsic motivation on a continuum ranging from the negative pole to a zero and to a positive pole. Lack of intrinsic motivation could be my "zero" and "repulsion" could represent the negative end. The distinction between the zero and the negative is not always evident.

11. **Deviant cases**. Here the authors refer to cases that stand out—like "outliers". I could observe and identify students in a classroom that exhibit extremely high or low levels of motivation. The contrast between these students may help us identify potential attributes or mechanisms that generate these motivational outcomes.

12. **Change the scale**. This heuristic calls for imagining extreme changes from small to large (or from large to small). A teacher might be able to promote intrinsic motivation in a few students but imagine the implications of raising every North American student's intrinsic motivation for mathematics just a little bit. It may impact on the collective ingenuity levels of nations. This example raises new ideas about group change and contextual changes potentially due to contagion effects.

13. **Processes and variables**. As Jaccard and Jacoby point out, in the social sciences we have been conditioned to focus on variables at a greater intensity than on processes. They suggest that one way to think more in terms of processes is to consider how a phenomenon fluctuates over time moving from one point to another. I am reminded again of my analogy of motivation to electricity as a limited supply that encounters resistance during transmission. Is intrinsic motivation in limited supply and how is it replenished? I can imagine a process involving a feedback loop between the person and the environment: a person intrinsically motivated in mathematics eventually ends up in a university math department with even more opportunities to maintain and increase her original interests.

For the next 13 heuristics, I am going to borrow heavily from Deci and Ryan's Self Determination Theory (see references) to think about intrinsic motivation. Obviously in the early stages of the development of a model, much of this information may not have been discovered yet.

14. **Abstractions or instances**. Let's considering different levels of abstractions. I could focus on instrinsic motivation in general and think of general principles. Perhaps intrinsic motivation involves a tendency for self-growth. (In fact, this is one of the general principles in Self-Determination Theory (Deci & Ryan, 1985; 2000; Ryan & Deci, 2000). I could focus on a specific instance such as the intrinsic motivation associated with playing video games. What is the nature of the engagement in this activity? How is it similar or different from the engagement in academic work? Are there any similarities between the engagement trying to achieve a higher level in a game and solving a mathematical problem? Again, if we refer to Self-Determination Theory, we recognize a general orientation toward competence and mastery.

15. **Make the opposite assumption**. The idea of opposite can be applied in different ways. I could ask, "what if intrinsic motivation did not promote achievement (i.e., the opposite of the general finding that intrinsic motivation does lead to achievement)". Let's use opposite in a different way by considering the direction of the relation between intrinsic motivation and achievement. Much research has focused on the hypothesis that intrinsic motivation increase achievement, but what about the possibility that achievement increases intrinsic motivation? This seems like a reasonable hypothesis and makes me think once again about the process. Perhaps, intrinsic motivation increases achievement which in turn maintains or produces even higher levels of motivation. More specifically,

with achievement comes more possibilities to move in the domain of interest (college, university, best laboratories in the world).

16. **The continual why and why not**. A series of "whys" may lead you to important discoveries. Here's a thought process based on a series of "whys" and answers. *Why do some people have high intrinsic motivation for mathematics?* Because, as kids they were exposed to pleasurable experiences involving math. *Why were these early experiences pleasurable?* Because someone (parents, Sesame Street, etc.) made them pleasurable. *Why were these experiences experienced as pleasurable?* Perhaps because the experiences involved just the right amount of challenge to make children feel that they were mastering and feeling competent about something. Here you can see how I arrived at the concept of mastery and competence again.

17. **Your grandmother is not always right!** Social scientists are often criticized that what they do is so obvious that their grandmothers could have saved them a lot of work. The heuristic here is to take an obvious idea and see if you can turn it on its head. Our grandmothers may have been able to tell us that if you like math you will do well at it. But ask Grandma if she thinks that you would like math even better if you were paid for doing well. I would bet that many Grandmas would say yes. But a classic study showed the opposite: rewarding students with money has a negative impact on their intrinsic motivation (Lepper, Greene, & Nisbett, 1973). This study was replicated in some research but not always. Perhaps of greatest value is that it generated much research and theoretical refinements.

18. **Pushing an established finding to the extremes.** Jaccard and Jacoby point out that too much of anything can eventually backfire or start to produce opposite effects. Let's consider what would happen at the extreme in intrinsic motivation. We know that people are not interested in everything. It seems logical that very high intrinsic motivation might be concentrated in one area given that there is just so much that can be done in a day. A student with extremely high intrinsic motivation in mathematics may spend most of his time in that domain and miss out on other important areas. This thought process brings to the fore the idea that motivation is a limited source of energy that can be allocated in different ways.

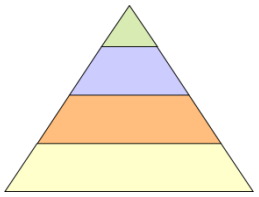
19. **Expose yourself to biographies, literature, and media**. This one should be fairly obvious but I would add that you might find useful material where you least expect it (e.g., poor quality shows, small local newspaper). Although sports do not play a major part in my life, the short biographical clips of Olympic athletes on television during Summer or Winter Games inspired me to ask specific questions about intrinsic motivation such as dealing with competing goals and the maintenance of motivation by small continual mastery rewards.

20. **Causes and consequences**. Think freely about as many causes and consequences of the phenomenon of interest and of people who clearly exemplify high and low behavioural levels of this phenomenon. What are the attributes of these two types of individuals? For intrinsic motivation I can think of adjectives such as engaged, absorbed, interested, and curious. Opposite attributes such as bored, apathetic, indifferent also come to mind. This exercise can help clarify the definition of your concept and perhaps some of its different

components. My attributes above seem to capture a dimension of focus and energy. For the first part of the heuristic, I could brainstorm causes such as genetic, early experiences, exposure to role models, interesting material, rich environment, openness to experience. For consequences I am thinking of achievement, learning, satisfaction, in-the-zone, pleasure, expertise, mastery, and competence.

21. **Shifting the unit of analysis**. In psychology we often focus on the individual as the unit of interest when we study behaviour, motivation, affect or cognition. However we can also focus on couples, families, small groups, gangs, teams, and communities. We are in fact seeing more of the latter types of investigations since the advent of multilevel modeling. I can apply this framework to intrinsic motivation by thinking about whether particular classes of students differ in their average intrinsic motivation. If I found that one class had a higher motivation score than another (and I assumed that the students were more or less randomly assigned to the classes), I would investigate differences between the teachers or any other characteristics of the classroom that may lead to motivational differences. I could think at an even more global level and investigate whether intrinsic motivation differs across nations of school children. I could even ask whether the Renaissance was associated with a particularly large population of individuals with high intrinsic motivation.

22. **Shifting the level of analysis**. Jaccard and Jacoby explain this heuristic as an investigation of the proximal and distal causes of the phenomenon in question. What are the causes in my immediate or proximal environment that make me intrinsically motivated or not. Perhaps I am looking at a great website that captures my attention and my interest. I can understand the material because it is well presented. More distal causes would include early environment opportunities with parents and teachers. In addition to the proximal-distal distinction proposed by Jaccard and Jacoby, I would add micro-macro levels of analysis. I am referring to the possibility to study a phenomenon at the physical, chemical, biological, physiological, psychological (cognitive/affective), sociological, anthropological, and theological levels. Although it probably makes much sense to study intrinsic motivation at the psychological level, links to other levels of analysis can provide a richer theory.

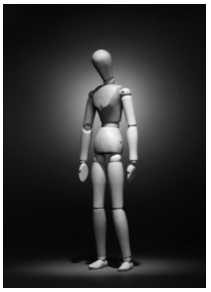


23. **Use both explanations (rather than one or the other)**. I like this one particularly because it reminds me of the debates of nature vs. nurture. Oh, how often I have heard a professor saying “it is both” but then go back into his world where only one exists. We have the research methodology and the computation power to incorporate many causes and their interactions in our models and theories. This easily applies to intrinsic motivation. Environmental or classroom influences as well as individual differences could both be included in a model. Dual-process models of cognition and affect are prevalent in psychology. It would be possible to investigate the nature of the thought patterns and emotions associated with intrinsic motivation.

24. **Methodological and technological innovations**. Jaccard and Jacoby provide examples of how advances in neuroscience permit the exploration of various cognitive processes. Another example that would apply to studying the processes of intrinsic motivation is the application of intensive longitudinal methods. These include diary studies or ecological momentary analyses in which day to day activities can be recorded as they occur. It would

be possible to design assessments that ask participants to evaluate not only their states of intrinsic motivation but also to record what they were doing at the time, what led to these states, how long they lasted, and why they ended.

25. **Focus on your emotions**. Emotions have a bad reputation when it comes to objectivity in science. However, studying something you have experienced personally such as depression, grief, panic attacks, a mystical experience, or the runner's high might reveal important attributes and processes of your concept. Now imagine studying the same phenomenon without your personal experience of it. The phenomenology of the phenomenon or "what it feels like" definitely provides a big piece of the puzzle. Intrinsic motivation is often associated with the emotion "interest". What does it feel like to be interested? At a very general level there is a sense of openness to experience to engagement with the world. Opposite emotions or involve disgust or fear.



26. **Your intellectual hot buttons**. This heuristic is probably an emotional one; you feel passionate (perhaps intrinsically motivate) that your topic is worth studying. Why am I interested in intrinsic motivation? I have always been fascinated by people who do find something that captures their interest and as a result develop expertise because of the time they have spent in a state of engagement.

References

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11, 227-268.

Jaccard, J., & Jacoby, J. (2010). *Theory construction and model-building skills. A practical guide for social scientists*. New York: The Guilford Press.

Lepper, M. R., Greene, D., & Nisbett, R. E. (1973). "Undermining children's intrinsic interest with extrinsic reward: A test of the 'overjustification' hypothesis". *Journal of Personality and Social Psychology 28,* 129–137.

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55, 68-78.