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Using Behavioral Science to Promote International Development

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Introduction

How can international development policies promote the uptake of agricultural technologies? What can they do to improve vaccination rates and compliance with medical treatment regimens? What are the most effective ways to encourage saving among poor individuals? These seemingly disparate questions have a common feature: they can be answered more effectively using policies that apply behavioral principles. A basic understanding of even a small number of behavioral principles can help policymakers to understand (and change) behavior patterns that are difficult to rationalize from a conventional economic perspective and that pose challenges to economic development.

We discuss two such principles that often go hand in hand: present bias and limited attention. Both have broad empirical support and wide-ranging implications for international development policy. For the sake of clarity, we begin by explaining the two principles separately, but both are relevant to many of the concrete examples we discuss in the second part of the paper.

Present bias

Investing in the future is critical to people's wellbeing. Saving to buy business supplies without paying exorbitant interest rates to a money lender, investing in fertilizer to improve next year's crop yield, sending your children to school, traveling to get preventative medical care—these are all examples of investing in the future. They require that one give up a smaller amount of money or time now to obtain much larger benefits in the future. These might all sound like obvious choices but behavioral science reveals that they are far from that. The choices people make about tradeoffs across time periods (intertemporal choices) depend on their time preferences—the relative weight they assign to present vs. future outcomes. Research has shown that people often don't optimize these choices relative to what they would say they want in a moment of self-reflection, outside the immediate pull of temptation. And the deviation from optimal is consistent: That is, in the abstract, they often prefer to make the long run investment but then get tempted in the moment to take the short-run benefit, only to regret it later.[1] For example, even if a parent knows she should be saving for her child's school fees, she might succumb to a tempting alternative like a satisfying meal *right now* when she is hungry. Conversely, a small but unpleasant obstacle *right now* can have a large influence on decisions: a parent might want to vaccinate her child but because it is a long hot walk to the clinic (and she doesn't know for sure whether the clinic will be open when she gets there), she procrastinates—perhaps indefinitely.

People often realize that they are susceptible to this sort of "time-inconsistent preference" and sometimes take elaborate steps to protect themselves from succumbing to short-term temptations[2, 3]. For example, they will choose to lock their money away where they can't access it immediately[4]. Some people may even *pay* for this restriction on their freedom by accepting a lower interest rate on money they can't access for some pre-determined period[5]. This psychological phenomenon is common to those living in rich and poor countries alike and is known as present bias.[5] Behavioral scientists have not only documented the phenomenon, they have worked with development practitioners to design policies and programs that take present bias into account. Many of these programs have been rigorously tested and proved to be effective at changing behavior in ways that lead to positive long-run outcomes.

Limited attention

To understand poverty one must recognize that its defining features—the shortage of money, time, and other basic resources such as sleep and food—affect psychological functioning in non-obvious ways that can undermine poor people's ability to escape their circumstances. This is true even when all of the necessary economic opportunities appear to be available. All of us have limited attentional bandwidth, but people with enough money need to spend much less of that attention on basic aspects of life (like acquiring food and shelter). This leaves the financially well-off with enough attention to handle unexpected hassles and make strategic decisions to improve their circumstances. In contrast, the challenge of navigating everyday life when one does not have enough basic resources is enormous. Poor individuals are often left with little or no spare attentional capacity to devote to important things like remembering to take their pills every day or navigating the complicated bureaucratic process to qualify for an assistance program. Making matters worse, poverty directly affects the environment where people live, often creating additional cognitive demands. For example, lack of access to basic services like piped water, electricity, child care, and direct deposit adds numerous daily decisions and hassles that deplete mental resources further.[6,7]

General Policy Principles

A number of general policy principles can be implemented to attenuate the harmful effects of present bias and limited attention, helping poor individuals improve their lives and reach the long run goals they want to achieve. We discuss those next and provide examples of how they have been proven to be effective in a range of policy sectors.

1) *Reduce the upfront cost of future-oriented behavior.*

Both the present bias and limited attention suggest the potential for major policy dividends from reducing the upfront cost of future-oriented behavior. People tend to struggle with procrastination—they delay doing what they know is in their long-term interest because there is almost never a compelling reason to bear the upfront cost today rather than tomorrow. The narrowing of attention among poor individuals—focusing on immediately pressing needs to the exclusion of other important but less urgent needs[7]—aggravates this natural tendency. As a

result, even minor upfront costs, like small copayments, inconvenience, or the need to expend physical effort can be important barriers to people's investment in their futures.

A key practical policy lesson that flows from these principles is to reduce, and ideally abolish, copayments for cost-effective health products for which a subsidy is justified (due to externalities or low levels of information, for example). Fifteen randomized trials show dramatic increases in take up from even small reductions in prices of products such as insecticide treated bed nets (ITNs), dilute choline, and deworming tablets.[8] This principle helped catalyze large-scale distribution of free ITNs in sub Saharan Africa, which is estimated to have saved 4 million lives since 2000.[9] But there is room to do the same for many other prophylactic products that are known to have the potential to improve wellbeing in the developing world.

Relatedly, this suggests that reducing the upfront costs associated with education could yield outsized benefits. One study, for example, found that providing free school uniforms to students in Kenya at a cost of $6, a small fraction of the cost of a child's education, led to a 6.4 percentage point increase in school attendance.[10] Helping countries reduce or eliminate school fees and giving vouchers for free school uniforms are practical and straightforward policies that could improve school enrollment in places where it is low.

In addition to reducing fees for long-term investments, minimizing or eliminating what might seem like trivial bureaucratic inconveniences can result in dramatic increases in the uptake of services. This includes policies like reducing or simplifying paper work (or better yet: automatic enrollments in programs), minimizing travel times required to take advantage of programs, and helping with childcare and transportation. For example, helping households to fill out the application paperwork for a (government?) credit to cover the cost of piped water in Morocco increased participation from 10% to 69%[11]. (This mirrors the US finding that helping families fill in FAFSA forms for federal student aid increased low-income students' college attendance rate by 24 percent[12]).

The need to travel even manageable distances (i.e., more than a 10- to 15-minute walk) is another type of inconvenience that can have an unexpectedly large dampening effect on the uptake of services. For example, in Malawi, the likelihood that people would show up to receive the results of an HIV test fell sharply as the distance they needed to travel to do so increased by even a small amount.[13] A similar observation was made in Kenya, where the likelihood that people would take advantage of protected water springs that reduce the risk of diarrhea fell with small increases in the distance they had to travel to do so.[14]

Because price and inconvenience are both barriers to take up, policy makers should be thinking carefully about the tradeoffs between them. Many might assume that the poor would be willing to endure significant inconvenience in order to avoid even a small financial cost for services but this assumption fails to appreciate that time is sometimes even more scarce than money for the poor. So, it can sometimes be better to charge a small fee and make a service very convenient than to charge nothing for a very inconvenient service. This point is illustrated by the success of a non-profit entrepreneurial model for delivering prophylactic health products in rural Uganda. A randomized evaluation found impressive community health gains when women sold underused health products like insecticide-treated bed nets, water purification tablets, and anti-malarial

drugs door to door at a discounted (but non-zero) price, eliminating the hassle of seeking these products out.[15] This is a very promising approach, which deserves to be scaled up. For example, this approach could be expanded to improve maternal and child health broadly, because travel is particularly difficult for pregnant women and those with young infants. Ideally all pregnant women would undergo at least one prenatal checkup (to assess risk factors, and to encourage the presence of a trained birth attendant), and all infants would receive basic immunizations. To the extent that these services can be provided within villages, or at least at coordinated central locations with transportation made easy and cheap (e.g. a teen helper coming to the woman's door to accompany her), evidence suggests this would increase rates of uptake significantly. Conversely, in situations where logistical constraints require that services be provided at less convenient locations, small material incentives (e.g., a bag of lentils and a set of metal plates) can be an effective way to offset inconvenience. For example, a small incentive increased immunization rates in rural Rajasthan from 6% to 39%.[16]

2) *Be thoughtful about the timing of interventions.*

Both of the key principles, present bias and limited attention, suggest that the timing of interventions can be critically important in ways that are not obvious from a traditional economic perspective. For example, sugar cane farmers in India typically receive their income once a year at the time of harvest and therefore tend to be relatively rich right after the harvest and relatively poor right before it. In a powerful illustration both of the attentional costs of poverty and of the importance of timing, a recent study documented that those farmers perform worse on tests of executive function and fluid intelligence in the period before the harvest, when money is tight. The difference in scores translates to roughly 10 IQ points.[17]

Traditionally, the timing of subsidies has been determined arbitrarily, presumably on the assumption that a subsidy delivered now is at least as useful as a subsidy delivered later. Based on recent evidence from behavioral science and development research, this is a missed opportunity. For example, as the finding with Indian sugar cane farmers above makes clear, low-income people may have more bandwidth and resources to evaluate and take up a new beneficial offer immediately after the harvest when they face fewer other pressing demands.

Aligning the timing of subsidies with the timing of important decisions or expenses is another effective strategy. For example, in Tanzania, promoters of community health insurance deliberately went to the distribution points of a cash transfer program to sign people up for the health insurance when they received the transfers (i.e. had greater liquidity). This contributed to a nearly 20 percentage point increase in the use of health insurance.[18] Similarly, agricultural products (such as fertilizer and hybrid seeds) can be more effectively promoted if farmers are approached at harvest time, when they have money available for those investments and when their attentional capacity is not overly taxed by the scarcity of financial resources. Finally, subsidies to encourage education could be timed to coincide with the time when school fees are charged. In a recent demonstration of this, a conditional cash-transfer program designed to increase education enrollment in Bogota, Colombia, showed to produce higher rates of re-enrollment when a portion of the monthly transfer was postponed until just before the re-enrollment period. Moreover, this time-sensitive design was particularly effective for those who needed it the most (and who were most likely be facing scarce liquidity and attention): the lowest

income students and those with the lowest participation rates.[19] To maximize effectiveness, such programs should consider that parents might need advance notice or help with planning and budgeting to ensure they have money available to provide whatever supplement is needed beyond the subsidy.

3) Offer costly commitment devices or request soft commitments.

People are often aware that hazards such as temptation or distraction at critical moments can derail their pursuit of long-term goals. As a result, they may be willing—even eager—to subject themselves to costly penalties for failing to stick to those goals as a way to .[20] For example, technologies that have been shown to increase profits are sometimes underused by poor farmers, even when farmers know about the technologies and say they want to use them. This puzzle may partly be explained by present bias: farmers get paid at harvest but hybrid seed and fertilizer are not needed until months later and farmers find it hard to hold onto their money until then. Offering a small, time-limited discount on the cost of acquiring fertilizer (such as free delivery) right after harvest, when money is relatively plentiful, is a form of commitment savings that has been found to increase purchase rates of fertilizers in Kenya by 11 percentage points.[21] Estimates suggest that, to produce a similar purchase rate later on, when fertilizer is normally purchased, a 50% subsidy of the purchase price would be needed.

One concern with commitment devices is that they come at a cost: locking money away means it is not available for unanticipated but genuinely important expenses. This worry can prevent people from taking advantage of commitment devices. An alternative, inspired by work on the theory of mental accounting, is to use soft commitments such as labeling a savings account for particular expenditures (like education) without a strict constraint on how it actually can be spent.[22] For example, in a recent study in Uganda, researchers compared a savings program in which saved money could only be used for educational expenses to an account in which spending the savings on educational expenses was *encouraged* but not required (i.e. it was possible simply to withdraw the cash). In both cases, families saved more and spent more on education supplies than a control group did. But families saved most when they knew they could still withdraw the money if they needed to.[23]

Thus, making commitment devices available (and easy to access) can be an effective tool—and indeed one that is sought out by individuals because they recognize their susceptibility to short-term temptation, poor planning, and distraction—especially at times of peak demand on their limited attentional resources. These tools are, however, not useful for all individuals and softer commitments, such as earmarking an account for particular expenses.

4) Introduce cognitive aids.

As poor individuals often have to attend to multiple pressing needs at the same time, the limits of their attention are continually tested.[7] Thus, it is not surprising that they may be more likely than others to miss crucial information or forget to take intended actions that could improve their welfare. Cognitive aids, including straightforward reminders or statements explicitly pointing out what might seem obvious to a person not suffering from attentional scarcity, can make a big

difference. For example, in a recent study, experienced seaweed farmers in Indonesia had noticed that the spacing between their seaweed strands affected their yield, so they paid attention to that when planting the strands. But the farmers failed to notice that the size of the seaweed strands they planted also affected their yield, even though this was easily observable. Consequently, they did not consider strand size in farming decisions and did not even know what the size of the strands they used was. The study showed that offering farmers the opportunity to observe how researchers varied the size of the strands and what effect that had on yields was not enough for farmers notice the relationship. Only when researchers explicitly pointed out the relationship between strand size and yield did farmers notice it and change their practices.[24] This has nothing to do with the intelligence of the farmers.[25] A fact is only obvious if the observer has the spare attentional capacity to notice it.

We all sometimes forget to do things we meant to do—take our pills, mail the rent check. But, perhaps unsurprisingly, when our attention is overtaxed, we are even less likely to follow through with intended actions. When people's attention is completely taken up with pressing demands, they are unlikely to step back and ask themselves whether there is anything else they are forgetting to do. A policy problem that exemplifies this worsened "intention-action gap" under bandwidth constraints is the incomplete adherence to medical treatment regimens for conditions like tuberculosis or HIV/AIDS. In the case of HIV, patients often receive a month-supply of pills at a time and pills must be taken daily. Yet, even when patients understand the importance and genuinely intend to adhere to the regimen, they seem to forget under the weight of other pressing demands on their attention. The consequences of such forgetting can be life-threatening, but a simple fix can help. For example, research in rural Kenya demonstrated that the percentage of patients who achieved adherence of at least 90% (i.e., near perfect adherence) during the nearly yearlong study period increased from 40% to 53% when they received weekly SMS reminders.[26] Similarly, while breastfeeding is considered the best practice (especially given that high-quality infant formula or clean water is not available in much of the developing world), it can be difficult to keep up a good feeding practice (i.e. exclusive breastfeeding, initiating breastfeeding in the first hour, etc.) due to competing responsibilities such as household chores or caring for older children. Simple cognitive aids can help, including for example, physical reminders such as stickers on bottles making it clear that they are appropriate primarily for older infants and toddlers.

Sometimes aids that might seem unnecessary to a person whose attention is not overwhelmed can be enormously helpful to a person whose attention is overwhelmed. Simple things like pointing out the obvious at the right time or sending well-timed reminders can be important tools to improve decision making among the poor. Reminder messages in particular have been delivered in field experiments by short messaging system (SMS), email, postcard, letter, phone, and in-person survey. They have been shown to improve a wide range of outcomes, including saving rates in Uganda,[23] loan repayment in Bolivia, Peru, and the Philippines,[27,28] compliance with obligatory child support payments in the US,[29] vaccination in rural Guatemala,[30] use of water treatment products in Kenya,[31,32] and payment of delinquent fines in the UK.[33] But reminders must not be too frequent or they risk crossing the line from useful aid to becoming an additional tax on attention.[26] Also, they are likely to be most effective for irregular events, such as immunization visits, where people are less able to form a habit.

A Need for Experimentation

In testing applications of these general behavioral principles, there are minor variations that work better than others. This suggests not only the need for experimentation but also the importance of sometimes subtle context and design features. For example, reminders are not all equally effective. While weekly messages worked very well, an alternative design with daily messages did not have any effect on HIV treatment adherence (presumably because too-frequent messages are ignored—or worse, an added cognitive burden).[26] Additional research to provide generalizable rules of thumb for design issues including timing, length and frequency of reminders, mode of delivery, content, cultural context, and the framing of messages is needed. And, wherever feasible, any new policy applying behavioral principles should be evaluated rigorously before being deployed at scale (as should all new policies).

A second issue worth pointing out is that, although there is evidence of significant impacts in the short run, we do not know how long these effects last. This is less of an issue in cases where the goal is to encourage one-off actions, like signing up for a program or moving from intention to action, but more of an issue in cases where sustained, repeated action is required to affect outcomes (e.g., long term treatment of chronic illnesses, or sustained productivity gains). Further research is needed in this area to understand the long-term effects of some of these programs.

What form could such research take in policy settings? Often, policy-makers are mandated to implement specific programs in specified settings and populations, seeming to leave little room for experimentation of the kind we describe above. But, because many of these interventions are inexpensive or free to implement, it is often possible to conduct experiments by layering behavioral interventions them on top of existing programs. For instance, reminder text messages can be sent in bulk using automated systems at extremely low cost. So, an existing program to promote vaccination (such as a vaccination camp) could easily and cheaply test the effect of adding SMS reminders in a randomly chosen subset of the target population.

Other messaging interventions like soft commitments can be added to existing programs in similarly straightforward ways, especially when the program already includes communication with potential recipients. For instance, it is trivial to add a request for a soft commitment to an already existing interaction with the recipient. Similarly, tests of optimal timing of interventions can often be studied without additional cost if programs are rolled out over a period of time. For instance, if fertilizer discounts are already being made available to farmers, policy-makers can vary the timing at which these discounts are announced in randomly selected areas and thereby learn about the differential impact of the program as a function of offer timing.[34] Thus, it is often possible for tests of behavioral interventions to "piggy-back" on existing programs, providing scope for experimentation even for policy-makers with strong and inflexible implementation mandates.

Policymakers need to experiment, but they also need to be aware of their own biases. Policymakers, like other humans, are bandwidth-constrained, and often devote too little thought to decisions because they think they already know the answer or because of their own political or moral views (e.g., evidence from World Bank staff[35]). Identical data may be interpreted in varied

ways, leading to different conclusions, as a result of the policymakers' own biases. And depending on their views, some policymakers might presume that behavioral interventions do not have any real effect, while others might see them as a silver bullet that can easily and cheaply solve all problems. The truth lies somewhere in-between. Nevertheless, it is now quite clear that behavioral interventions are a valuable tool that, when combined with more conventional policy tools like regulation, education and training, standard economic incentives, and infrastructure, can help ameliorate poverty and improve social wellbeing.

Conclusion

Current research suggests that poor individuals confront more challenging limits on attention. These can impair decision making and intensify present bias, leading to fewer human capital investments and future-oriented behaviors. The context of poverty produces these outcomes by placing what amounts to an additional "tax" on mental bandwidth. Behavioral insights suggest ways to tweak programs, often in ways that complement more traditional approaches, to overcome these challenges. An application of the principles outlined here offers tremendous promise for improving the effectiveness of development programs.

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