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WHERE WAS I LAST WEDNESDAY?

Why contact tracing needs a dose of memory science.

In the battle against COVID-19, we have few weapons. Even as vaccines roll out, countries are still struggling to contain the outbreaks that burden healthcare systems and impede economic recovery. Technology, heralded early on as the ‘silver bullet,’ has offered limited benefits. Contact tracing—the century-old process by which public health officials identify those who have been exposed to infection—remains among the most powerful tools for containing outbreaks. However, its success is variable.

To cognitive scientists, this comes as no surprise. Contact tracing’s ability to break the chain of transmission is only as good as the information that interviewed cases provide. And hidden in the variable that a contact tracing model might call ‘completeness’ is another weak link in the chain: human memory. To scientists of memory, contact tracing needs to gather complete, precise, accurate information from witnesses to an ill-defined event. Contact tracers, therefore, face the same challenges as their witness-interviewing counterparts.

WITNESSES UNWITTINGLY OMIT INFORMATION

The frustrating reality of contact tracing is that retrospective importance and urgency are unlikely to translate into better recall. Many of the locations we move through, the activities we engage in, and the encounters we have, are entirely mundane. We go to the gym, buy groceries, pick up a pizza, meet friends and colleagues. These situations—and even the riskiest among them—are simply the backdrop of our daily lives. Without arousal, salience, and emotion to engage processes that prioritise attention and enhance memory, many of these events are unlikely to feature in our recollections.

Omitted information presents the greatest challenge for contact tracing. Failure to recall a single event can mean that an unidentified person (say, a neighbour we spoke to briefly) or unidentified people (say, the other people at the cinema) can unknowingly transmit the virus.

Contacts can also be lost when interviewed cases fail to recall symptoms. Someone might remember waking up short of breath

on Thursday but neglect to report feeling unusually tired since Monday—a small omission leading to three days of missed contacts. Finally, our memories can be imprecise, so even when people recall relevant behaviour, there is no guarantee they will provide adequate detail.

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WITNESSES MAKE MISTAKES

Memory reports are not only notoriously incomplete, they are also notoriously error-prone. Some of these errors occur when people over-rely on what usually happens (“On Fridays, I usually go to the movies”). People also make errors when they fail to distinguish what they experienced from information they encountered somewhere else.

People can even combine details of several genuine events; these faulty recollections can be particularly easy to mistake for real experiences, because their components all really happened—just not together as a single event.

WITNESSES HAVE VULNERABILITIES

Even when operating at an optimal level of cognitive capacity, people’s memory for incidental information is typically poor. But many witnesses are not operating at that level—whether due to young or old age, limited intellectual functioning, mental distress, or other factors. In this pandemic, interviewed cases may be unwell and in pain. Pain disrupts performance on various cognitive tasks, and acute illness—including viral infection—is associated with impaired executive function and

working memory. Impairments like these might hinder cases’ ability to recall details or even to engage in the retrieval activities necessary to remember those details.

WITNESSES CAN BE RELUCTANT

Successful interviews depend on people’s willingness and motivation. Yet, for numerous reasons, interviewed cases might not be fully cooperative. They might have limited understanding about the utility of the information they provide or lack faith in the contact tracer or agency involved. They might not want to share private or sensitive information—perhaps because they are worried about how, when, and by whom that information will be used. Most pragmatically, they might be concerned about the consequences of speaking to a contact tracer about their personal wellbeing and livelihood, particularly if required to self-isolate for an extended period.

WHAT CAN HELP?

Although contact tracing is one of the main COVID-19 infection-control strategies available, standardised contact tracing protocols—that are informed by memory research—are strangely absent. Guidelines from agencies such as the WHO or the CDC correctly emphasise the need to obtain an exhaustive list of contacts, but provide little to no guidance about methods to achieve this. Thus, in the case of COVID-19, we know the ‘what’ but the ‘how’ is much less clear.

The good news is that we already have a considerable body of empirical and applied literature that provides a framework for increasing the completeness and accuracy of the information we obtain from people.

Our challenge now is marshalling expertise and resources, so we are ready for what comes next.

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