

NOT JUST CHILD'S PLAY

By Alex Hutchinson
Photographs by Boaz Perlstein

Archaeologist Ella Assaf Shpayer studies prehistoric stone tools for clues about innovation and the dissemination of new ideas

In a limestone cave about a dozen kilometres from Tel Aviv, among the rich trove of prehistoric artifacts left behind by hundreds of thousands of years of human habitation, are a lot of really bad stone tools. There are more than a thousand flint cores inside the cave — the chunks of rock from which sharp blades were “knapped” off with a hard blow from a limestone cobble. Some have long, smooth faces where blades were expertly detached, but others are pocked with irregular scars that produced nothing useful. “The beginners, they try again and again, and repeat the same mistakes,” says Ella Assaf Shpayer, one of the archaeologists who excavated the site. “And they get mad, so you even see their frustration in the core. It’s a very emotional thing, knapping.”

These botched tools — as frustrating as they were for the would-be toolmakers — reveal intimate details about how knowledge was passed on in the Lower Paleolithic period, which lasted from about three million to 200,000 years ago. And Shpayer, a faculty member in the Department of Archaeology and Ancient Near Eastern Cultures at Tel Aviv University (TAU), believes that they illustrate a broader pattern that has likely recurred throughout history: at pivotal turning points, when new ideas and technologies emerge in response to social or environmental change, it’s the children who lead the way.







The blades or flint knives studied by Ella Assaf Shpayer were mainly used for butchering in Qesem Cave. Blade production involving knapping is considered to be complicated and advanced, not appearing in Europe until hundreds of thousands of years after it did in the Levant.

Shpayer's interest in the field dates back to her own childhood, to conversations with her father. "He used to talk to me about everything: the stars, nature, the fact that millions of years ago there were other species of humans living in the world," she recalls. That notion of other humans stuck in her mind, and she eventually decided to study archaeology at TAU. "I don't know if I thought I would become an archaeologist," she says, "but I just wanted to know more."

By the end of her first year of undergraduate studies, Shpayer had already started doing archaeological field work and analyzing prehistoric stone tools. She ended up staying at TAU for her master's and doctoral degrees, the latter of which was funded in part by an Azrieli Graduate Studies Fellowship between 2016 and 2018, supervised by Ran Barkai and Avi Gopher. Right from the start, Barkai noticed that Shpayer brought a fresh perspective to her work. "You could see how her brain works while she was physically in the dirt," he recalls. "It was clear she will not conduct 'more of the same' research but will bring her own thinking to the table."

In particular, Shpayer wanted to find stories that others had overlooked. "Researchers tend to forget specific groups like women, children, the older generation and so on," she says, "and I always had a passion for trying to find these missing people." Among the artifacts discovered in Qesem Cave, the site near Tel Aviv where she began working with Barkai and Gopher, were several children's teeth. She also began noticing poorly made stone

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tools. Some were clearly the work of complete beginners, while others reflected the work of highly skilled experts. For her PhD, Shpayer decided to study how toolmaking knowledge was transmitted — a question with important implications, since researchers still don't agree whether early humans directly taught each other or simply learned by observation and imitation.

Elephants disappeared from the Near East around 400,000 years ago. According to one theory, that was the trigger for a series of major changes among the inhabitants of the region. Forced to hunt smaller and faster animals such as fallow deer instead, they became more agile. They also started using fire regularly and systematically to roast meat, developed sophisticated toolmaking abilities and learned new ways of processing and preserving food.



These changes show up in Qesem Cave, which was first occupied around 420,000 years ago, most notably in the presence of a central hearth. “Fire has a cultural meaning,” Shpayer says. “It makes everybody come and sit together near the fire. Then you see people talk and convey messages. They share experience with one another and share their food. Fire took the whole learning process to the next level that we don’t see in primates.” While there’s evidence of toolmaking in various parts of the cave, it’s around the hearth that the evidence for shared toolmaking is most abundant. That’s where the experts knapped high-quality blades and then handed over the flint cores to the

children watching eagerly over their shoulders to let them have a try.

Making a stone blade isn’t easy. It takes planning, knowledge and good motor skills, and you have to choose the right materials and know the appropriate techniques. During her doctoral studies, Shpayer went to a workshop with an expert knapper in Spain. “I know the basics, but I’m not a good knapper,” she admits. “I always use the very bad examples that I made in my workshop to show my students: Look, this is how it looks when you do a bad job.” Still, the hands-on experience changed her perspective. “It’s a very complicated process,” she says, “so I really

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Located about a dozen kilometres east of Tel Aviv and discovered in 2000 during road construction, Qesem Cave contained a rich trove of prehistoric artifacts left behind by hundreds of thousands of years of human habitation, including more than a thousand flint cores from which sharp blades were knapped off with a hard blow from a limestone cobble

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So how did early humans master these new techniques, spread them across the region and preserve them from generation to generation? In much the same way that your toddler figures out the advanced features of your new phone before you do. Shpayer points to a long list of cognitive and cultural features of human childhood that favour the adoption and dissemination of new ideas and technologies. For example, humans have an exceptionally long childhood even compared to close kin like chimpanzees, who typically produce as much food as they eat by the age of seven. The lengthy period of protected time frees human children to play, an activity tightly linked to both learning and innovation.

There’s also evidence that children are more open to new ideas. Alison Gopnik, a cognitive scientist at the University of California at Berkeley, has argued that children fill a crucial niche as explorers in human societies. Gopnik points to studies showing that children are quicker than adults to repurpose common tools in unexpected ways to complete a task and better at figuring out unusual cause-and-effect patterns. “Children are so creative,” Shpayer says. “They use the knowledge that we give them in ways that we don’t think to use it ourselves.”

Shpayer’s focus on the unique role of children as innovators and disseminators of knowledge dovetails with the work of Gopnik and others. But her use of tangible prehistoric evidence to support this hypothesis adds a new dimension — one that arose not just from her interest in neglected groups like children, or from her careful fieldwork in Qesem Cave, but from the combination of both, Barkai says. “Her interest in the role of children in the advent of technological innovations,” he adds, “is her own initiative.”

Among the projects Shpayer is now tackling is a comparatively recent one, looking at knowledge transmission among farmers 10,000 years ago, to see if the agricultural revolution changed the role children played and how they learned. But there’s an even more recent case study that she can’t help thinking about. “It was in the middle of my PhD that my twins were born,” she says. “It really made me think a lot about the ways we teach, the ways we learn and about how, in our Western society, we always try to tell kids what to do.”

Within hunter-gatherer societies — both those that are still in existence today and, in Shpayer’s reading of the evidence, those that roamed the Near East hundreds of thousands of years ago — independence is a crucial value. Children learn by imitation and observation, and perhaps are also given some direct instruction, but above all are given the freedom to experiment and try things themselves. “They allow their children to explore, and try, and make mistakes, and try again,” she says.

In contrast, she sees in herself the impulse to constantly correct her children — to ensure that they’re not wasting time or energy or resources, that they’re being *productive*. It’s an approach, she worries, that runs counter to all she has learned about the ways children can help human societies respond to changing conditions. So she’s trying to be a little more like the expert knappers who sat around the dancing flames in Qesem Cave and gave up their valuable flints to clumsier hands. “I appreciate these early humans a lot,” she says. “I think they were wise and we can learn many things from them.” ▲●■



One of the flint cores from which blades were knapped off, a practice that required planning, knowledge and good motor skills, as well as the right materials and appropriate techniques. “It’s a very complicated process,” says Shpayer, “so I really appreciate ancient humans now in a different way, on a different level.”