Greater than the sum of our parts: The evolution of collective intelligence

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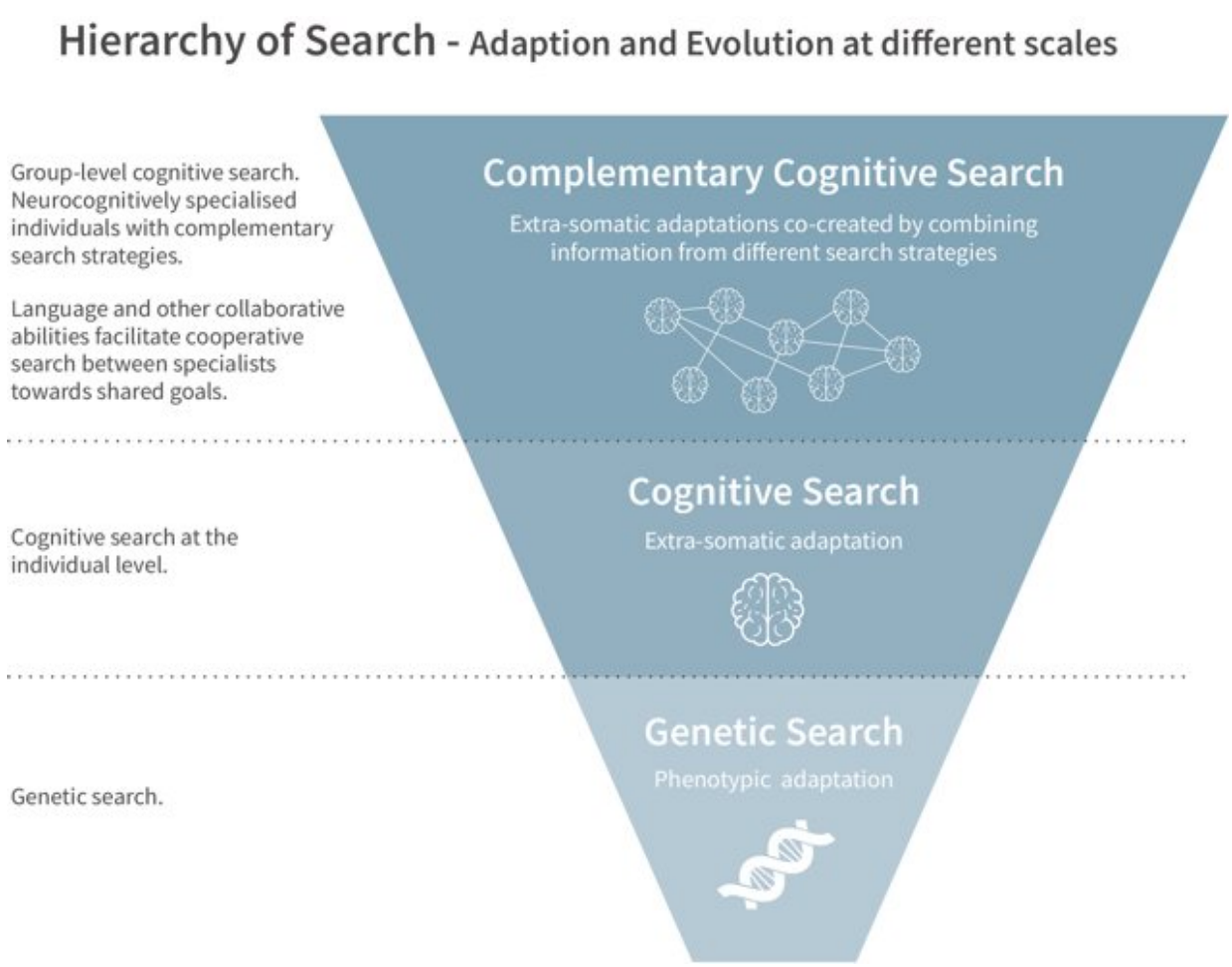

Credit: University of Cambridge

The period preceding the emergence of behaviourally modern humans

was characterized by dramatic climatic and environmental variability—it is these pressures, occurring over hundreds of thousands of years that shaped human evolution.

New research published today in the *Cambridge Archaeological Journal* proposes a new theory of human cognitive evolution entitled 'Complementary Cognition' which suggests that in adapting to dramatic environmental and climactic variabilities our ancestors evolved to specialize in different, but complementary, ways of thinking.

Lead author Dr. Helen Taylor, Research Associate at the University of Strathclyde and Affiliated Scholar at the McDonald Institute for Archaeological Research, University of Cambridge, explained: "This system of complementary cognition functions in a way that is similar to evolution at the genetic level but instead of underlying physical adaptation, may underlay our species' immense ability to create behavioral, cultural and technological adaptations. It provides insights into the evolution of uniquely human adaptations like language suggesting that this evolved in concert with specialization in human cognition."

The theory of complementary cognition proposes that our species cooperatively adapt and evolve culturally through a system of collective cognitive search alongside genetic search which enables phenotypic adaptation (Darwin's theory of evolution through natural selection can be interpreted as a 'search' process) and cognitive search which enables behavioral adaptation.

Dr. Taylor continued, "Each of these search systems is essentially a way of adapting using a mixture of building on and exploiting past solutions and exploring to update them; as a consequence, we see evolution in those solutions over time. This is the first study to explore the notion that individual members of our species are neurocognitively specialized in

complementary cognitive search strategies."

Complementary cognition could lie at the core of explaining the exceptional level of cultural adaptation in our species and provides an explanatory framework for the emergence of language. Language can be viewed as evolving both as a means of facilitating cooperative search and as an inheritance mechanism for sharing the more complex results of complementary cognitive search. Language is viewed as an integral part of the system of complementary cognition.

The theory of complementary cognition brings together observations from disparate disciplines, showing that they can be viewed as various faces of the same underlying phenomenon.

Dr. Taylor continued: "For example, a form of cognition currently viewed as a disorder, dyslexia, is shown to be a neurocognitive specialization whose nature in turn predicts that our species evolved in a highly variable environment. This concurs with the conclusions of many other disciplines including palaeoarchaeological evidence confirming that the crucible of our species' evolution was highly variable."

Nick Posford, CEO, British Dyslexia Association said, "As the leading charity for dyslexia, we welcome Dr. Helen Taylor's ground-breaking research on the evolution of complementary cognition. Whilst our current education and work environments are often not designed to make the most of dyslexia-associated thinking, we hope this research provides a starting point for further exploration of the economic, cultural and social benefits the whole of society can gain from the unique abilities of people with dyslexia."

At the same time, this may also provide insights into understanding the kind of cumulative cultural evolution seen in our species. Specialization in complementary search strategies and cooperatively adapting would

have vastly increased the ability of human groups to produce adaptive knowledge, enabling us to continually adapt to highly variable conditions. But in periods of greater stability and abundance when adaptive knowledge did not become obsolete at such a rate, it would have instead accumulated, and as such Complementary Cognition may also be a key factor in explaining cumulative cultural evolution.

Complementary cognition has enabled us to adapt to different environments, and may be at the heart of our species' success, enabling us to adapt much faster and more effectively than any other highly complex organism. However, this may also be our species' greatest vulnerability.

Dr. Taylor concluded: "The impact of human activity on the environment is the most pressing and stark example of this. The challenge of collaborating and cooperatively adapting at scale creates many difficulties and we may have unwittingly put in place a number of cultural systems and practices, particularly in education, which are undermining our ability to adapt. These self-imposed limitations disrupt our complementary cognitive search capability and may restrict our capacity to find and act upon innovative and creative solutions."

"Complementary cognition should be seen as a starting point in exploring a rich area of human evolution and as a valuable tool in helping to create an adaptive and sustainable society. Our species may owe our spectacular technological and cultural achievements to neurocognitive specialization and cooperative cognitive search, but our adaptive success so far may belie the importance of attaining an equilibrium of approaches. If this system becomes maladjusted, it can quickly lead to equally spectacular failures to adapt—and to survive, it is critical that this system be explored and understood further."

More information: The Evolution of Complementary Cognition:

Humans Cooperatively Adapt and Evolve through a System of Collective Cognitive Search, *Cambridge Archaeological Journal*, DOI: 10.1017/S0959774321000329