at the apple to pick it up, and finally at the box for placement. When the unambiguous instruction was presented in the one-referent context, participants never looked at the incorrect destination (*13*) (Fig. 1).

In the two-referent context, participants often looked at both apples shortly after hearing "the apple," which reflected the fact that reference could not be established on the basis of just that input. Participants looked at the incorrect referent during 42% of the unambiguous trials and during 61% of the ambiguous trials. [In contrast, in the one-referent context, in which reference could be established given just "the apple," individuals rarely looked at the incorrect object (pencil); this occurred during 0 and 6% of the trials for the ambiguous and unambiguous instructions, respectively.] The time it took participants to establish reference correctly in the two-referent context did not differ for the ambiguous and unambiguous instructions, which indicates that "on the towel" was immediately interpreted as a modifier, not as a destination. Individuals then typically looked directly to the box for object placement without looking at the incorrect destination (Fig. 2). In contrast with the one-referent context, ambiguity in the instruction did not affect the proportion of eye movements to the incorrect destination in the two-referent context (*14*) (Fig. 3).

Our results demonstrate that in natural contexts, people seek to establish reference with respect to their behavioral goals during the earliest moments of linguistic processing. Moreover, referentially relevant nonlinguistic information immediately affects the manner in which the linguistic input is initially structured. Given these results, approaches to language comprehension that assign a central role to encapsulated linguistic subsystems are unlikely to prove fruitful. More promising are theories by which grammatical constraints are integrated into processing systems that coordinate linguistic and nonlinguistic information as the linguistic input is processed (*10, 15*). Finally, our results show that with well-defined tasks, eye movements can be used to observe under natural conditions the rapid mental processes that underlie spoken language comprehension. This paradigm can be extended to explore questions on topics ranging from recognition of spoken words to conversational interactions during cooperative problem solving.

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6. Eight objects were on a table with a center fixation cross. Each trial began with the instruction, "Look at the cross." The eye-movement latency difference between the conditions with and without objects with similar names was reliable [$t(7) = 3.04$, $P < 0.02$].
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13. This difference between ambiguous and unambiguous instructions was reliable by a planned comparison [$t(5) = 4.11$, $P < 0.01$].
14. The interaction between context and ambiguity for eye movements to the incorrect destination was reliable [$F(1,5) = 8.24$, $P < 0.05$]. Also, a three-way interaction between context, ambiguity, and type of incorrect eye movement (to object or to destination) revealed the bias toward a destination interpretation in the one-referent context and toward a modification interpretation in the two-referent context [$F(1,5) = 18.41$, $P < 0.01$].
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TECHNICAL COMMENTS

Origins of Fullerenes in Rocks

Naturally occurring fullerenes have been found in rock samples that were subject to singular geologic events such as lightning strokes (*1*), wildfires at the K-T boundary (*2*), and meteoritic impacts (*3*). These findings are expected, as fullerenes form normally under highly energetic conditions. However, P. R. Buseck *et al.* (*4*) reported the presence of C_{60} in a carbon-rich rock sample from Shunga, in Karelia, Russia, in which the host geologic unit was highly metamorphosed and there was no evidence of exposure to extreme conditions. If fullerenes did form naturally in such an environment, we would expect them to be widely present elsewhere, and there would be many ramifications. For example, the presence of fullerenes in the earliest times would have implications for the evolution of life (that is, as an early source of large molecules).

We studied the occurrence and distribution of fullerenes in carbon-rich rocks, including samples of shungite from the deposit in Shunga. To avoid sources of contamination by fullerenes, our samples were prepared in laboratories where there had been no previous work done on fullerenes. The outer 2- to 4-mm portion of the shungite samples was removed, and only the core material was gently crushed and ground before mass spectrometry (MS) analysis was carried out directly on the rock powder. Laser Fourier-transform MS and thermal desorption negative ion MS methods were used. In the thermal desorption MS, the temperature was scanned up to 450°C, at which C_{60} and C_{70} are fully volatilized. One sample was purposely contaminated with 100 ppm of commercial fullerenes as a control and to check the sensitivity of the analysis. The result of this reference test indicated that we could detect fullerenes at 10 ppm, or less, without difficulty.

The three samples from the Shunga locality (*5*) had a variable carbon content of about 100, 90, and 10% by weight. These samples were hosted by about 2-billion-year-old metamorphosed volcanic and sedimentary rocks of the Karelian terrain, which extends northwest through Finland and into Finnmark (northern Norway). We also analyzed one carbon-rich sample from the Bidjovagge mine near Kautokeino, Finnmark, from rocks with broadly similar age, provenance, and metamorphic history as those of Shunga.