

Klahr, D. (2001) Directions to “Eureka!” *Science*, 292, 2009

Dear Editor:

Your recent editorial “An Algorithm for Discovery” *Science*, 4/6/01, v. 292, p. 13. presents a tongue in cheek flow diagram, as well as a (presumably) more serious set of informal heuristics (a.k.a. “principles”), for the process of scientific discovery. I find it surprising and somewhat disappointing that *Science* would treat the psychology of discovery in such an informal and amateurish fashion.

Einstein did say, as your editorial quotes him: “The whole of science is nothing more than a refinement of every day thinking” But he went on to say much more, and, in effect, suggested a program of further investigation in the area that we now call cognitive science. The full quotation reads as follows:

“The whole of science is nothing more than a refinement of every day thinking. It is for this reason that the critical thinking of the physicist cannot possibly be restricted to the examination of concepts of his own specific field. He cannot proceed without considering critically a much more difficult problem, the problem of analyzing the nature of everyday thinking.
(Einstein, 1936, p.59)

In the more than 60 years since Einstein made this remarkable statement, the cognitive sciences have made substantial advances our understanding of the “difficult ... problem of analyzing the nature of everyday thinking”.

At the same time that we have gained scientific knowledge about human thinking processes, we have also learned about how those processes are used in scientific discovery. Although this might be surprising and disconcerting to those who view the process of scientific reasoning as ineffable and unknowable, the connection between everyday thinking and scientific thinking is -- as Einstein correctly suggested -- more in the detail than in anything fundamental.

“The scientific way of forming concepts differs from that which we use in our daily life, not basically, but merely in the more precise definition of concepts and conclusions; more painstaking and systematic choice of experimental material, and greater logical economy.” (*The common language of science*, 1941, reprinted in Einstein, 1950, p.98)

Several decades of research on the psychology of scientific discovery process have revealed how normal cognitive processes enable humans to generate the "precise definitions," "systematic choice of experimental material," and "logical economy" that Einstein identifies as the hallmarks of scientific thought (For reviews of this extensive literature see Feist & Gorman, 1998; Klahr, 2000; Klahr & Simon, 1999; Zimmerman, 2000). Clearly, if *Science* is interested in publishing ideas about the scientific discovery process, it can do better than devoting its scarce pages to informal anecdotes that trivialize, rather than rigorously investigate, the very foundation of its topic.

Sincerely,

David Klahr

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1. Overview. In this tutorial, we'll introduce client-side service discovery via "Spring Cloud Netflix Eureka". Client-side service discovery allows services to find and communicate with each other without hard-coding hostname and port. The only "fixed point" in such an architecture consists of a service registry with which each service has to register. A drawback is that all clients must implement a certain logic to interact with this fixed point. This assumes an additional network round trip before the actual request. Eureka Yurts & Cabins 191 Bear Ridge Rd Eureka Springs, AR 72631. We recommend putting our address in your GPS instead of just entering Eureka Springs. If coming in on I-49, take Exit 86 and go East on US-62 for a more direct route to Eureka Yurts and Cabins. There are multiple AR-187 turn offs when driving on US-62 from Rogers or Gateway. You need to turn onto the 3rd AR-187 at the Riverlake Gas Station. See the map below. The eureka clients will call other clients using Eureka server service discovery. Introduction. In this tutorial, we will develop Spring Cloud Netflix Eureka Server and Spring Cloud Netflix Client, for simplicity, we will refer to them as Eureka server and Eureka client in this article. To show how it works, we will build one Eureka Server and a couple of Eureka clients and show the communication between these Eureka client applications using Eureka Server. We will use the postman application to show the actual demo. Get step-by-step walking or driving directions to your destination. Avoid traffic with optimized routes. Menu. Submit. Clear search. Current location disabled. Learn more. Route Settings. Get Directions. Legal. Help. Eureka, CA. —. Show Labels. Satellite. Map. Live traffic. Traffic Slow Downs.