IGRAPHICAL DISCOVERY

What features of a nove graph influence how it is interpretec?

Graphical Discovery

is the act of making sense of a new or unfamiliar graphic representation. Unlike GRAPH COMPREHENSION where we use our knowledge of a graphical formalism (its rules) to interpret the depicted information, graphical discovery describes situations where we must first figure out how the graph works.

These results imply

discovering the formalisms of a new graphical system is challenging, and our behaviour is strongly influenced by prior knowledge of conventional formalisms (such as the Cartesian coordinate system).

When encountering an unfamiliar graph, we evidently place greater importance on the graph's orientation and axis structure than on its gridlines and marks when constructing meaning for its use of space.

To scaffold GRAPHICAL DISCOVERY, designers should (1) draw attention to meaningful spatial

TRANSITIONS IN UNDERSTANDING A NOVEL COORDINATE SYSTEM

In a series of studies, we leveraged a graph with an unconventional coordinate system to explore how the design features of the graphical framework (axes, gridlines, marks and orientation) influence graphical discovery.

EXPERIMENTAL DESIGN

mixed design with 1 between-subjects factor DESIGN CONDITION, and 1 within-subjects factor (QUESTION)

- stimuli they would see

GRAPH DISCOVERY TASK

designed to assess participant's ability to correctly interpret the novel coordinate system of the Triangular Model (TM) graph

- Each question is designed to reveal the system
- incorrect



Can YOU discover this graph? The points represent intervals of time (work shifts) Answer the question: Which shifts(s) end at 4 PM?

The Triangular Model graph is typically misinterpreted as a cartesian scatterplot.

 For each study, participants were randomly assigned to a **DESIGN CONDITION** that controlled which graph

• Participants completed the GRAPH DISCOVERY **TASK** online, asynchronously, via a web application

 Participants were introduced to a scenario where they were asked to play the role of a project manager handling a schedule of work shifts • They were instructed to use a graph of the shift schedule to answer a series of 15 questions

• Each **QUESTION** included a graph [features dictated by **DESIGN CONDITION**] and single multiple-choice-multiple-response question

participant's interpretation of the coordinate

Response ACCURACY was scored as correct /

experimental stimulus

STUDY 1 GRIDLINES

DESIGN INTUITION:

increase or decrease extent of diagonal gridlines to make the triangular structure more salient, ostensibly drawing attention to the triangular intersection between each point and the x-axis



STUDY 2 RAARKS

DESIGN INTUITION : alter the mark indicating a single data point to emphasize novelty (condition : cross) and reinforce the meaningful relation between a point and the diagonal gridlines (condition : arrow)



DESIGN INTUITION: [shape] change orientation of the y-axis in space to emphasize novelty, and remove blank space in which no data points can be plotted

[scale] change scale of triangular shape from isosceles to equilateral



Amy Rae Fox, PhD James Hollan, PhD Caren Walker, PhD

the length altitude (vertical rise) matches

AM 09 AM 10 AM 11 AM 12 PM 01 PM 02 PM 03 PM 04 PM 05 PM 06 PM 07 PM 08 PM

the length of the horizontal interva

Start & End Time the length of the diagonal side matches the length of the horizontal interval

UC San Diego **COGNITIVE SCIENCE**

TIC COCGNUTION CROSS-CULTURAL INFORMATIO OP CONTINUES INTOPSychology CROSS-CULTURAL