Observing versus seeing, perception versus detection, and data versus nature

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Observing the sun, the moon, and the stars, unaided human observers have seen anything from travelling Gods to holes in a dome. Undeniably, in all science, perception of something must in some sense come first for anyone to bother measuring. The importance of direct observation and perception may, however, be exaggerated. Observing is not always seeing what is, but rather what is not -- is simply imagined. Human everyday perception can thus remind of a Rorschach test.

Theoretically and technically aided observation was required for Manâ€™ss recent detection of many structures now taken for granted in our worldview, including the solar system and the Milky Way, the home of all human observers. -- Some of the elements where visible, but their spatial and temporal relationships too hard to discover without adequate theoretical and technical tools. â€“ The even more recently discovered DNA patterns present all around and within, also quickly became fundamental parts of our worldview. Clearly, being in front of human eyes and being important to humans does not guaranty being seen. Imagination, new concepts, special tools and procedures may be strictly required. Since most human problems as well as their solutions are related to human interactions this justifies the deepest scrutiny.

The discovery of atomic particles and interaction relied heavily on advanced mathematics and technology [1]. Mathematics, now defined by most mathematicians as â€œthe science of patternsâ€□ allows description and detection of ever more patterning in nature, often where none was seen (for example, Fractal, Chaos, and Symmetry/Group mathematics). Modern physics thus exemplifies a formalized pattern-view of nature minimally based on unaided perception, but of daunting importance for all modern life. No human interaction patterns can, however, be predicted (as opposite to interpreted or explained) on the basis of particle physics or DNA patterns alone.

Regarding measurement, obviously, phenomena in nature that cannot be detected, cannot be counted, classified, or analyzed in any way. Measuring the size or frequency of invisible patterns such as, for example, polygons, circles, or any other forms of interest in nature therefore presupposes their detection, which again presupposes structural concepts such as â€œpolygonâ€□ and â€œcircleâ€□. Invisible behavioral patterns may thus become â€œvisibleâ€□ given adequate structural hypotheses concerning relationships between their visible parts.

Discovery of behavioral â€œparticlesâ€□ and pattern now depends less on direct perception as video freezes â€œtimeâ€□ and â€œspaceâ€□, while mathematics and computers allow domain-specific analysis that gradually replaces domain-independent statistical analysis.

For example, rather than relying on direct perception of facial behavior, the basic measurements may be automatically recognized changing contrasts in human faces, which then allow the detection of complex and sometimes invisible spatial and temporal patterns. And just like nuclear particles and the solar system some may never be really â€œseenâ€□.

Humans had been talking for numerous millennia before even imagining grammars and only since about 50 years has knowledge of nonverbal interactions benefitted from systematic studies, which are still hampered by lack of adequate models and tools. Discovering the real-time, multi-level, partly parallel structure of everyday interactions thus remains a formidable challenge and the attention shifts to â€œsequential analysisâ€□ and questions about what comes â€œnextâ€□. While frequent behaviors like eye blinks offer a safe guess, but typically of little value for interpretation and/or prediction. For this, reference is usually required to higher order spatial and temporal envelopes (patterns, context).

The t-pattern, t-packet, and derived concepts [2, 3, 4] are attempts at capturing some features of the spatial and temporal â€œprobability landscapeâ€□ of behavioral events. T-packets are at once sequential and non-sequential recurrent structures based on the t-pattern type, which has already allowed the detection of complex patterning in many kinds of behavior and interactions varying from interactions in brain cell networks to childrenâ€™s object exchange and problem solving dyads where little or no structure was found through either direct observation or standard statistical approaches [5, 6, 7].

These hypotheses and illustrative results obtained with the specially designed algorithms are presented. The examples rely on direct perception to a highly different degree, from measures of physical movements of parts of the human face that could be fairly easily automated, to coded acts, that is, directly perceived and classified behavioral entities requiring complex cognitive processing.

Also presented are, so called, â€œGhost cyclesâ€□ (t-ghostcycles), which are cyclically recurring t-patterns of elements each of which does not per se share the cyclical occurrence of the pattern and thus no provide any explanation of the cyclic occurrence of the pattern [8, 9].

Einstein, Max Planck, and Newton mostly analyzed data collected by others, but their work would hardly be labeled simply â€œdata analysisâ€□, something they could simply have delegated to any mathematician or statistician with little or no knowledge of physics or astronomy. In the behavioral sciences, however, analyzing data and analyzing behavior often gets confused. Thus sometimes practically all the (computational) behavior analysis in a project is labeled simply as â€œdata analysisâ€□ or â€œstatistical analysisâ€□ and is happily delegated to, for example, any statistician around. Possibly due to the spectacular progress in computational methodology (including A.I.) wile computer illiteracy is still common, there seems to be much confusion of a) domain-independent standard statistical data analysis requiring no knowledge of behavior and b) domain-specific theory driven research automation requiring deep knowledge of behavior. -- Could this be simply because both cases involve computers and statistics?

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