

# Human Behavior Analytics with Proxy Interrogatories

# Introduction

Mission sets across defense, intelligence and security organizations would benefit from applying effective human behavior analytics to data sets derived from intelligence activities. To build these advanced analytics, data scientists can leverage the expertise of social scientists and use that input to build models that will be better able to predict human behavior. With proper clinical training, psychologists are able to identify actions or behaviors which can be indicative of an individual's personality or disposition. Data scientists at Elder Research can map these actions or behaviors to available data and create human behavior analytics which more accurately predict human behavior than other available methods.

In 2014, former Navy Secretary Richard Danzig published a paper, writing:

“...as with all security issues the critical actors are people and the critical determinates of their behavior are political, economic, psychological, and sociological variables.”

This human security mission is like no other. Each and every day, a hard-working and skilled workforce is working diligently to protect and defend the United States against very real and serious threats. Behind every threat this nation faces is an individual with an agenda; yet, understanding the critical determinants of their behavior is within reach using advanced human behavior analytics.

## Population Classification

It is common for many different missions to have a list of individuals who are interesting for some particular reason. Thinking of these lists as monolithic entities provides only limited insight and their length can be quite overwhelming for analysts. To make better sense of the list and to get traction in analytical problem solving, it is useful to decompose the list into smaller categories of interest. One way to do this is to consider multiple questions of interest about the list, particularly how individuals are related in the context of the larger group. A variety of questions about human behavior come to mind:

- What are an individual's primary motivators (e.g. ideology, power, money)?
- Who is most likely to assume a leadership role?
- Which individual are most susceptible to influence?
- Are there individuals who are more consistent in their behavior, perhaps due to a personality disorder?

Psychologists may already weigh in on these types of questions, but there are natural limitations to the scalability of their analysis. They may focus on an individual, carefully reviewing the available data to make conclusions about that person; or, they may provide general information, like a profile, of what to look for within the group. Unfortunately, humans are poorly equipped to go through enormous volumes of data in a short period of time. Expert opinion in human behavior is unparalleled in accuracy at present, but so long as resources are limited, it will be impossible to scale it up to analyze large groups.

By contrast, computers are particularly well-suited to process large amounts of data in a short period of time. In fact, leveraging modern computer technology, machine analysis may be unlimited for data analysis at the scale in question. The only question is, can it be made accurate enough?

## Solution

The two analytical paradigms discussed above – experts and machine learning -- present have the following strengths:

1. *Experts have an exceptional facility for identifying more-interesting individuals in a list based on the actions, behaviors, or characteristics exhibited by those individuals*
2. *Computers are able to process large quantities of data in a short period of time in a rapidly repeatable, scalable way*

Integrating these two capabilities into a single process will bring to bear the strength of each capability. Experts can contribute meaningful insight into what is interesting as well as ways to ascertain that information. Computers can provide the processing power to go through large sets of data, rapidly and consistently scoring large sets of individuals.

### Determine Categories of Interest

In order to identify individuals of interest, stakeholders must first articulate their definition of interesting. Developing criteria for what makes an individual interesting starts at a high level with a general question. Stakeholders then collaborate with psychologists to understand key characteristics associated with individuals that fall into that category.

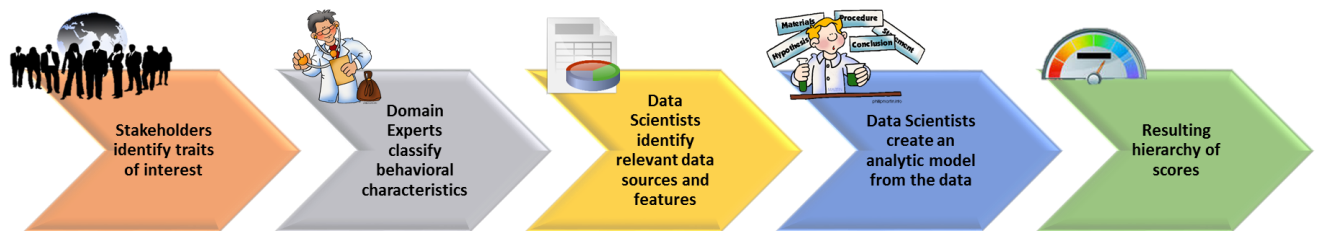
To develop the analytic solution, domain experts generate an evaluation instrument that can be applied to the entire list of individuals. The instrument is designed by the clinician to answer specific questions about the individuals—whether certain characteristics are present. Typically, the presentation of these characteristics—the *diagnostic criterion*—is evaluated through a clinical interview process.

One particular well-known resource for identifying mental disorders is the Diagnostic and Statistical Manual of Mental Disorders (DSM). The DSM offers a common language and standard criteria for the classification of a variety of mental disorders. Other tools which identify categorical outcomes may also be useful in developing the diagnostic criterion (e.g. MBTI, MMPI, or WAVR-21).

### Map Data to Traits

Since clinicians lack the resources to evaluate each and every individual on the list, *proxy interrogatories* are developed to help get at the information. For example, a clinician may decide that someone should be classified as an alcoholic if they consume three alcoholic drinks or more on four or more days per week. If data exists indicating the drinking behavior of an individual, the data scientist can simply map the available data to the appropriate interrogatory.

A viable use of this approach is within a security and counterintelligence program. Data for building this solution are derived from two primary types of sources: baseline and enrichment. Baseline data often includes basic biographical information such as work history, professional references and credit reporting. Enrichment data may be available in some contexts from investigative information, lifestyle patterns or communication data. Enrichment data can be collected on an on-going basis and at a much higher frequency than baseline data. User network activity monitoring, physical access control logs, real-time criminal or financial data sets, and public records can all be used to enrich baseline data to help flesh out a descriptive profile of a person's behavior. All of these data points can be mapped to proxy interrogatories and rolled up into diagnostic criteria.



## Scoring

If multiple data sources are rolled up into each interrogatory, and the various interrogatories are rolled up into each criterion, a more comprehensive view of each individual will take form. By developing appropriate scoring – say weighted sums of criteria – for the instrument, scores can be calculated for each individual, revealing their relative ranking within the overall population. Each member of the list is scored using the expert-driven heuristics and categories of interest (i.e. answers to the particular questions at hand), and persons of primary interest are those with the higher scores. The result of collaboration between the domain experts and the computer is a human behavior analytic that uses a hybrid expert-machine process to triage a list of individuals.

## Conclusion

Human behavior offers an enormous volume of complex and multi-faceted data. Leveraging human behavior analytics will help to mitigate threats to national security. The brain is making snap decisions nearly continuously, and there is typically very limited insight into how an individual will behave. Still, social science has useful perspective on how people behave in general. Leveraging this expertise and plugging it into human behavior analytics will provide meaningful insight across a population. Where one individual's behavior may be hard to predict, statistically, the predictions about individuals within a larger set will be much better than chance.

**EXAMPLE (hypothetical)**

Stakeholder: “I have a population of 1,000 people. I’m wondering, if something happened to the current leader, is there someone in the group who may naturally step into a leadership role. Are there members of my population that I should look at more closely?”

Domain Expert Response: “Some studies have indicated that individuals showing strong traits of narcissism are more likely to assume a leadership role if a vacuum in leadership were to occur. According to the DSM there are a number of traits associated with a Narcissistic Personality Disorder (NPD). You should be especially interested in someone who exhibits behaviors consistent with NPD diagnostic criteria.

Instrument criterion:

- 1) Does the individual demonstrate a grandiose sense of self-importance, perhaps exaggerating achievements and talents or expecting to be recognized as superior without commensurate achievements?

<b>Grandiose sense of self-importance</b>		
<i>Data Source(s)</i>	<i>Proxy Interrogatory</i>	<i>Score</i>
<i>Personal interview, job resume, public records, reference interview</i>	<i>Are there <b>three to four</b> incidents of discrepant information between what an individual has claimed to have accomplished and what can be verified through corroborating information?</i>	<i>1</i>
	<i>Are there <b>five or more</b> incidents of discrepant information between what an individual has claimed to have accomplished and what can be verified through corroborating information?</i>	<i>2</i>
<i>Personal interview, job resume, individual development plan, reference interview</i>	<i>Is there evidence that an individual has <b>one or two</b> goals/aspirations that are grossly out of line with their actual skills and abilities?</i>	<i>1</i>
	<i>Is there evidence that an individual has <b>three or more</b> goals/aspirations that are grossly out of line with their actual skills and abilities?</i>	<i>2</i>

- 2) Is the individual preoccupied with fantasies of unlimited success, power, brilliance, etc?

<b>Preoccupied with fantasies of unlimited success</b>		
<i>Data Source(s)</i>	<i>Evaluation Criterion</i>	<i>Score</i>

- 3) Does the individual believe that they are special and unique and can only work best with other high-status people?

<b>Believe that they are special and unique</b>		
<i>Data Source(s)</i>	<i>Evaluation Criterion</i>	<i>Score</i>

- 4) Et cetera...

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