The ‘Average Person’ Thinking About Radicalization: A Mind Genomics Cartography

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Abstract
A group of 227 respondents, about half Muslims, half non-Muslims, evaluated different sets of 24 vignettes about beliefs, intending to ‘predict’ whether the person described in each vignette would be or not radicalized. The respondent also selected the likely emotion to be felt. The results suggest a low basic belief in the radicalizability of the described person according to non-Muslim respondents and a firmer fundamental belief in radicalizability by the Muslim respondent. The non-Muslim respondent differentiated strongly among the different elements in terms of prospective radicalization indications and linked three emotions to the vignettes (belong, identify, master). The Muslim respondents did not differentiate among the different elements of perspective signals to radicalization and linked only one emotion to the vignettes (secure). Unlike the emergent mindsets from other Mind Genomics studies, there do not appear to be mindsets concerning radicalizability, only a degree of differentiation rather than pattern.

Introduction
The history of human society has plenty of examples where a group of people, labeled as terrorists, will take violent actions against the rest of the community. This phenomenon, referred to as terrorism, has occurred in the past and present times. Terrorism is carried out by people with strong beliefs not shared by the rest of the community. People that become terrorists go through a process of radicalization.

The writings of Marx and others in the late nineteenth century and the notion that it would be only by force that a group of people could accomplish the desired goals of society contributed to radicalism. This theory would become relevant for the radicalization of Islam (Moghaddam 2009; Lewis 1990). An orderly transformation of society could not, and would not happen, simply because of the nature of people, the ossification of classes, and the natural fight to maintain the status quo. A few centuries early, it might have been Hobbes who said that civilization was the war of all against all, presaging Marx and saying that radicalization is probably the normative outcome of our mutual struggles (Heller 1980).

Those are a few of the historical notes. What has become essential in this early part of the twenty-first century is the disturbing fact that we are familiar with radicalism and that it is part of our everyday diet of news. It is known that there are radicals around the world, and we know from incidents such as 9/11, twenty short years ago from this writing, that the tentacles of radicalism remain present in our society. We need only to browse the media to hear the latest distressing news about the depredations of the radicals.

In the scientific literature about radicalization, in general, it is a relative abundance of short papers published in the style of the academic world. One need only use tools like Google Scholar and search for radicalization to find many dozens of relevant papers, relatively short, non-experimental, some theoretical, some observational. And, of course, tie-ins of the radicalization to social issues, world views, economic struggles, etc.

Thus, radicalization has been the subject of many studies worldwide. Some authors have studied the roots of radicalization (Calhoun 2012; Odorfer 2015), some others the stages of radicalization (Sabic-El-Rayess 2020), and others the patterns of radicalization (della Porta and Haupt 2012), to name a few.
The literature is, at its surface, quite different when it comes to radicalization in the world of Islam. There are papers, of course, but many of the documents are books rather than short articles. The topics are similar, always devolving down to the inherent beliefs, the way the future radicalized person perceives himself or herself, and a story rather than a sociological or anthropological analysis (Milla et al. 2019; Phares 2007; RUSHDIE 2006; Turner 2014; Fredholm 2012). Studies show that there is no detailed profile for a terrorist (DeAngelis 2009).

This paper contributes to the existing literature in three different ways. First, this study addresses the perception of everyday people regarding profiling a potential terrorist. To our knowledge, as of this writing (Spring 2022), there is little in the way of understanding the mind of people involved in profiling a potential terrorist. Second, this study uses an experimental design of ideas, Mind Genomics (Milutinovic and Salom 2016), (Moskowitz et al. 2006), to understand people's minds concerning specific messages. Mind Genomics is a collection of well-accepted yet novel approaches to understanding the respondent's mind. Third, the overarching goal of this paper is to present to a large audience of people's minds concerning specific messages. Mind Genomics is a collection of well-accepted yet novel approaches to understanding the need to enrich people's perception of terrorist profiling at the practical level. We hope this research will be beneficial for individuals involved in counterterrorism.

The Method

The main goal of this study is to discover the factors which will generate a radical. With the daily increase of bad news, such as displacing entire populations from one location to another (the case of the civil war in Syria), the inevitable outcome of the debacle in Afghanistan, an ongoing saga (Braithwaite and Wardak 2013), coupled with the tinder-box feelings of people around the world toward injustices, real or imagined (e.g., Black Lives Matter; (Lebron 2017)), it is becoming increasingly important to predict WHO is likely to become a radical, and in this case more specifically a jihadist.

Identifying people ahead of time makes it easier to understand the dynamics of their commonality and repair the problems that lead to the jihadist behavior, if possible. Of even more importance is the potential for identifying individuals who are likely to become jihadists. This possibility is unpleasant to contemplate because it may 'track an individual' but could save many lives by preventing attacks by these same individuals.

The notion of using Mind Genomics as a way to understand the jihadist mind was suggested by Professor Jerry (Yoram) Wind of the Wharton School, University of Pennsylvania, around 2011. Prof. Wind indicated that one might treat the issue of radicalization, whether jihadist or other, as one treats the case of becoming a customer of a product or service and switching to a particular brand. The only problem emerging was that it was almost impossible for this study to work with respondents who were already known jihadists because access to them was not possible. There are though studies where researchers had access to terrorists or ex-terrorists (Morrison 2020; Dawson 2019; Sabic-El-Rayess 2021). There are even studies advising on how to interview terrorists (Khalil 2019).

From the realization that radicalization to become a jihadist could be thought of as a combination of switching to a brand, albeit one with a ‘religious significance’ and that it would be complicated to talk to such ‘consumer’ came the notion that one might use the ‘wisdom of the masses’ (Surowieciki 2005). There appeared to be virtually no easily accessible public data about the use of the wisdom of the masses to estimate the nature of an individual. One could ask people to read vignettes about a person and rate the likelihood that the person would become a jihadist. And thus, this study.

The origin of this particular study was the objective to begin a research sequence on understanding the prediction of who might be a radical. The topic did not start with understanding a radical but emerged from pioneering work in the world of food products (Zemel et al. 2018, 2019; Saulo et al. 2019), financial services (Iollari et al. 2020), health (Gabay and Moskowitz 2019; Gabay et al. 2018) and finally education (Todri et al. 2020; Gere et al. 2019). The main issue in all of the above-mentioned studies was to understand the mind of the person, not so much based on who the person is or what the person does, but rather on how the person thinks. At first, this sounds quite simple and rather obvious. People tend to believe that people are divided into natural groups (age, gender, income, education, citizenship, etc.), a fact that is obvious but then somehow describes how a person thinks by WHO a person is. The fundamental departure of this study from the previous studies of this type was evaluating the future behavior of an individual described in a vignette. The vignette describes the person, and the rating is a projection of the respondent's feeling about the person being described in the vignette. That approach has recently been pioneering work in shoppers' minds (Harizi 2021).

Mind Genomics as a Research Approach to ‘Predict’ the Likelihood of Future Behavior

The approach used in this paper followed the guidelines of Mind Genomics (Moskowitz et al. 2006). The objective of Mind Genomics is to uncover the groups mentioned above of people who 'think in different ways.' People think differently.
about the same topic, and they use different criteria when judging products (e.g., what they will eat/drink), services (the type of medical service they find to ‘their taste’), political kinds (the parties, platforms, and candidates for who they will vote (Murr 2011)). Also, people differ in how they perceive social situations (Gofman 2009) and their reactions to law cases regarding who is innocent versus guilty, the degree of guilt, etc. When it comes to law cases, only one crime stands out as engendering only one mindset, the crime of murder (Moskowitz et al. 2020).

The approach by Mind Genomics is operationally simple and (almost always) reveals different mindsets by the pattern of people's responses.

The patterns may emerge with as few as two mindsets and become patently clear with three or four mindsets extracted from the respondent population. With two mindsets, there is virtually always an indication that there are at least two or more ways of looking at the same set of messages. That is, with two mindsets, the researcher already sees clear evidence of actual differences. However, those differences may require three, four, five, or even six mindsets to emerge. Once these mindsets emerge, it becomes possible to fine-tune one’s message to accord with the predilections of the mindset, viz. using statements that ‘resonate’ and avoiding messages which irritate (Milutinovic and Salom 2016; Gere and Moskowitz 2021; Gofman and Moskowitz 2010a).

This study aims to apply Mind Genomics as a tool to understand what behaviors and beliefs people do feel will eventuate into a person becoming radicalized. It is common knowledge that there are radicals in the Muslim population (Lewis 1990). Is it possible to extract an underlying pattern of behavior, which, when once described, will lead people to guess that this person will become radicalized?

This study presents an application of the ‘Wisdom of the crowd’ (Surowiecki 2005) to uncover, if possible, early signals for radicalization. As we move into the actual research, we should keep in mind that when we speak about radicalization, we deal with jihad radicalization, as clearly suggested by the nature of the elements or messages the test vignette contains. Thus, to some extent, the data discussed here will be interpretable as the probability of a person becoming a radical Islamist, with all the connections to violence and killing that are attached to such radical beliefs.

The Mind Genomics Process as the Guide

Mind Genomics is an emerging science with origins in statistics (experimental design), psychophysics (measurement and functional relations between physical stimuli and judgments), and consumer research (focus on decision making for topics of every day, in everyday situations, rather than in contrived situations) (Moskowitz et al. 2006).

The Mind Genomics process comprises a series of well-defined steps, intending to present test stimuli to respondents, measuring their reaction, and by doing so, quantifying the raw material based upon the pattern of responses to the test stimuli. The notion of cartography is that we are ‘mapping’ the underlying territory rather than using the data to confirm or falsify a hypothesis (Gere et al. 2017).

The Stepwise Approach by Mind Genomics Applied to the Topic of Radicalization

Step 1: Choose the Topic and the Raw Material

At this stage, the objective is to clarify the nature of the issue and fill out a template of raw material messages. The template instructs the respondent to ask six questions about the topic, which could tell a story by portraying different aspects. For each question, the researcher is instructed to select six alternative answers. The only requirement is that the answers, called ‘elements or messages, must stand by themselves as simple declarative statements that paint a coherent word picture (Todri et al. 2020).

Table 1 presents the set of six ‘questions’ and six elements (viz. answers) to each question, generating 36 elements altogether. Note that the questions will never be presented to the respondents. Instead, the questions are simply presented as a way to ‘move the story along, so that there is some ‘action’ in the vignette, and not merely an array of the same type of element, each competing with the other elements.

Step 2: Create an Experimental Design Underlying the Vignettes, Create the Vignettes, and then Create the Rating Questions

The conventional research would test each of the 36 elements in Table 1 in a randomized order, instructing the respondent to rate each element on one or several scales. The objective of the conventional research is to create a profile of the elements on attributes, compare the elements to each other, and make inferences about the respondent’s mind based on the pattern of the ratings.

The conventional research, the one-at-a-time approach, treats all elements the same way. There is no sense of a ‘story’ or even an understanding of the nature of the respondent. The conventional approach is sterile. Furthermore, the respondents can shift their judgment criteria based on the nature of the element. This means that both the element and the criterion of judgment vary. The problem is worse when the elements are brands, prices, sensory aspects, and perhaps health benefits, which cannot be easily compared on a 1:1 basis. There is no logical way to do that. The problem
is disguised in this study but still remains. We are not sure that the respondent can rate the different messages with the same scale unbiasedly.

The strategy of Mind Genomics is to test messages in combination, with the combinations created according to a ‘recipe booklet’ called an ‘experimental design’ (Ryan and Morgan 2007). The test stimuli are specified combinations, the specifications provided by the design so that the individual elements are statistically independent of each other. To accomplish this objective, the experimental design determines the exact combinations. With 36 elements falling into six questions, the experimental design calls for a precise set of 48 combinations, 36 of which comprise four answers and 12 of which contain three answers. No combination or ‘vignette’ can have

| Question A: What is the point of view regarding women? |
|--------------------------------------------------------|
| A1 It’s irrelevant what women wear                       |
| A2 Women may wear open sleeves and above the knee shorts… nothing beyond that |
| A3 Women should wear a hijab …& clothing which fully covers them |
| A4 Women should wear a hijab …never jeans or revealing clothing outside their home |
| A5 Women must wear a hijab at all times.. no make-up.. stay away from westerners … beaten if they disagree |
| A6 ‘Women who don’t wear a hijab or burqa … or wear revealing clothing… nothing more than sex slaves’ |

| Question B: What are the upbringing and attitudes regarding interpersonal violence? |
|-------------------------------------------------------------|
| B1 Accepts …people bully others                             |
| B2 Accepts….. people doing violent acts towards others     |
| B3 Worries about anti-Islamic policies                      |
| B4 Victim of persistent aggression                          |
| B5 Victim of persistent bullying                            |
| B6 Victim of violent acts                                   |

| Question C: What is the view of friendships?                 |
|-------------------------------------------------------------|
| C1 No friends                                               |
| C2 Has friends in both the gay community.. and from many religious backgrounds |
| C3 Friends with people from many religious backgrounds       |
| C4 Strong preference for Muslim friends                      |
| C5 Muslim friends are conservative                           |
| C6 Opposes … and friends oppose … liberal Muslims, gay people and members of other religions |

| Question D: What is the view of Islamic law?                 |
|-------------------------------------------------------------|
| D1 Doesn’t care very much about written Islamic laws         |
| D2 Does best not to eat pork or drink alcohol                |
| D3 Believes in the 5 pillars of Islam                       |
| D4 Believes in the 5 pillars of Islam..& most of the non-violent Islamic laws governing human interaction |
| D5 Islamic law has higher precedence … should replace the legal system in use today |
| D6 Those who do not follow all of the Islamic laws.. are non-believers …punished in the ‘afterlife’ |

| Question E: What are the basic principles about.. and response to infractions of… Islamic law |
|-------------------------------------------------------------|
| E1 To die as a martyr.. greatest way to serve serving Allah  |
| E2 There is one God (Allah) … Muhammad is his messenger     |
| E3 Polygamy is permitted ... Muhammad had multiple wives     |
| E4 Strictly against gambling… intoxicants …. polytheism     |
| E5 Homosexuals and adulterous women … should be stoned      |
| E6 Apostates.. threats to Islam and caliphate …must be slain |

| Question F: What are the social and religious practices regarding Islam |
|-------------------------------------------------------------|
| F1 Keeps distance from religious people                      |
| F2 Does not practice Islam … but.. accepts its culture       |
| F3 Prays when convenient … visits Mosque only on important days of the Islamic year |
| F4 Makes 5 daily prayers, visits Mosque for Friday afternoon prayer..& on important days of the year |
| F5 A conservative follower of Islam … follows all 5 pillars of Islam..visits Mosque regularly |
| F6 Follows all 5 pillars of Islam … rejects other faiths & modern culture |
two or more elements from one question. A vignette can have at most one element from a question, but by design, in any vignette, two or three questions do not contribute.

Another significant consideration in Mind Genomics is the objective to reduce ‘noise’ by covering a lot of the design space. Each respondent evaluates a different set of 48 vignettes. The mathematical structure of the vignettes for a given respondent is the same as for any other respondent. The only difference is that the combinations differ by a permutation scheme (Gofman and Moskowitz 2010b). This permutation scheme ensures that the Mind Genomics experiment tests many combinations each one time. The variability behind each combination is high because it is tested once.

In contrast, conventional research selects a limited number of combinations and tests each one many times. That repeated test, viz. replication, reduces the ‘noise’ or variability by averaging it out, at the cost of focusing on one microscopic area of the design space and hoping that the selection of the test combinations was made correctly. In contrast, conventional studies with experimental design subtly confirm the original choice of the test material. On the other hand, the error that would ensue later on from the analysis is substantially reduced because the researcher has empirical data from a lot of the ‘design space’ to contrast the two Mind Genomics ends up exploring.

The test vignettes themselves are presented without fanfare, comprising the introduction below. The combinations of 3–4 elements, one element per row, centered, without connectives, and then rating questions at the bottom:

You will see a series of vignettes about a person. Each vignette describes a different person. All vignettes are different. Read the whole vignette quickly at your own pace. Get a QUICK sense of the person being described. Give you FIRST IMPRESSION .. you ‘gut feeling’...Don’t stop to think too much. We want your spontaneous, immediate reaction (Element 1) (Element 2) (Element 3) (Element 4 – may be absent by design)

What is the likelihood of THIS person becoming RADICALIZED OVER TIME? 1 = None (0%) … 9 = Certain (100%)

What one term fits this SPECIFIC PERSON? Select 1 = Achieve 2 = Belong 3 = Empower 4 = Engage 5 = Esteem 6 = Identify 7 = Master 8 = Nurture 9 = Secure

**Step 3: Execute the Study by Inviting Respondents to Participate Through an Email with an Embedded Link to the Survey**

The study itself is executed online. Respondents receive invitations and participate. The invitations can be sent either by an online panel or by using networks of friends.

The respondents who participate are rewarded for doing so. The actual terms of the reward and the exact identification of the respondent are nowhere available to the researcher or the public. The researcher knows a self-profiling classification of the respondent (age, gender, and questions about education, background, etc., but cannot identify the respondent.) Everything is anonymized and left to the panel provider.

The actual in-field execution of the study for this so-called 6 × 6 design with 48 vignettes requires around 15–17 min of respondent time, a significant reason for recompensing them for participation. The respondent enters the study, begins the evaluation of the 48 vignettes, and afterward completes the self-profiling classification.

The respondent cannot possibly answer in a ‘politically correct’ fashion because the vignettes appear to be created in what might best be called a ‘blooming, buzzing confusion, in the words of Harvard psychologist William James when asked to describe the perceptual world of the newborn (Dooley 1990).

With three or four elements per vignette, the underlying structure of the design cannot be discerned, and thus the respondent quickly descends into an almost robotic indifference, still paying attention but at a lower level of vigilance. This descent into an almost automatic, non-thinking response allows Mind Genomics to obtain data from a respondent whose judgments are not ‘guarded.’

**Step 4: Prepare the Data for Analysis**

The preparation is reasonably direct. The database comprises 227 sets of 48 rows, one set for each of the 227 respondents who completed the interview. In total, there are 10,896 (227 × 48) observations analyzed. Each row comprises the necessary information, including the self-profiling classification of the respondent repeated 48 times, once for each vignette, and the experimental design expressed as 36 0’s and 1’s, each column corresponding to one of the 36 elements. The absence of the element was denoted by 0. The presence of the element in the vignette was marked by 1. The database was then followed by the answers to the two questions, first the rating of likely radicalization (1–9 scale), and then the choice of the emotion (selection of one of nine feelings).

Mind Genomics works with binary scales, 0/100. The rationale for the binary scale is that the binary scale makes interpreting the data more manageable and makes the results simpler to present and comprehend. People are accustomed to rating their experiences on a category or Likert Scale, such as the 1–9 scale for Question 1, so the data acquisition is relatively straight. There are no complaints. The problems emerge when it comes time to interpret the results. The question is typically asked, ‘what does rating X mean?’ Rating X can be a three or a six or any number in between. It is difficult for the user to understand the meaning of the
results. Furthermore, despite the proclivity of researchers to talk about statistical significance and such, the user of the data cares more about what the data mean, and only then whether the data acquired by the study are meaningful. For that reason, we create the binary scales, no/yes.

**Results**

The following three sections represent the results obtained in this study.

**Understanding the Data by Relating the Binary Ratings to the Presence/Absence of Elements**

Simply summarizing the data from this Mind Genomics study can be a significant task since there are 36 elements, two rating scales, nine subscales, nine emotions, and results from 227 respondents, about half of whom are Muslims. The remaining half are not Muslims. The best way to understand the data is by cutting away all of the data, except for those particular points that both teach and are statistically salient.

We begin with creating the models or equations relating the presence/absence of the 36 elements to the transformed binary ratings. We focus on two newly created variables, Rate9, and Rate1, respectively. The definitions are:

- **Rate9:** Ratings of 9 transformed to 100, ratings of 1-8 transformed to 0, and a small random number is added to the transformation to ensure that the regression modeling works.
- **Rate1:** Ratings of 1 transformed to 100, ratings of 2-9 transformed to 0, and a small random number is added to the transformation to ensure that the regression modeling works.

The modeling for the first analysis uses the data from the total panel and then from different groups of respondents as they define themselves. The 48 ratings for every 227 respondents were combined into one large data set, and the OLS (ordinary least squares) (Zdaniuk 2014) regression was estimated. The regression model is expressed by the simple linear equation: binary variable = \( k_0 + k_1(A1) + k_2(A2) \ldots + k_{36}(F6) \).

The additive constant, \( k_0 \), is the baseline value, viz. the expected percent of vignettes to be assigned the rating 9 (or the rating 1) in the absence of elements. All vignettes comprise 3–4 elements by design, so that the additive constant is a purely estimated parameter, but one which gives a sense of the baseline feelings.

Table 2 shows only the groups and columns for the two binary variables (Rate9 = very high probability of being

| Total Panel               | Rate9 | Rate1 |
|---------------------------|-------|-------|
| Additive constant         | 17    | 16    |
| E1 To die as a martyr, greatest way to serve serving Allah | 10 | |
| E5 Homosexuals and adulterous women ... should be stoned | 7 | |
| E6 Apostates... threats to Islam and caliphate ...must be slain | 7 | |
| By self-declared Males    | Rate9 | RATE1 |
| Additive Constant         | 15    | 13    |
| E1 To die as a martyr... greatest way to serve serving Allah | 10 | |
| E6 Apostates... threats to Islam and caliphate ...must be slain | 6 | |
| E5 Homosexuals and adulterous women ... should be stoned | 6 | |
| B2 Accepts..... people doing violent acts towards others | 6 | |
| By self-declared Females  | Rate9 | Rate1 |
| Additive constant         | 18    | 21    |
| E1 To die as a martyr... greatest way to serve serving Allah | 11 | |
| E6 Apostates... threats to Islam and caliphate ...must be slain | 8 | |
| E5 Homosexuals and adulterous women ... should be stoned | 8 | |
| By self-declared non-Muslim | Rate9 | Rate1 |
| Additive constant         | 4     | 18    |
| E1 To die as a martyr... greatest way to serve serving Allah | 19 | |
| E6 Apostates... threats to Islam and caliphate ...must be slain | 13 | |
| E5 Homosexuals and adulterous women ... should be stoned | 12 | |
| B2 Accepts..... people doing violent acts towards others | 7 | |
| C1 No friends             | Rate9 | Rate1 |
| By self-declared group Muslim | Rate9 | Rate1 |
| Additive constant         | 30    | 15    |
| Self-Defined as non-Muslim | E1 ACHIEVE | E2 BELONG | E3 EMPOWER | E4 ENGAGE | E5 ESTEEM | E6 IDENTIFY | E7 MASTER | E8 NURTURE | E9 SECURE |
|----------------------------|------------|-----------|------------|----------|-----------|-------------|-----------|------------|----------|
| C5 Muslim friends are conservative | 9          |           |            |          |           |             |           |            |          |
| C4 Strong preference for Muslim friends | 9          |           |            |          |           |             |           |            |          |
| C2 Has friends in both the gay community.. and from many religious backgrounds | 8          |           |            |          |           |             |           |            |          |
| F1 Keeps distance from religious people |            | 7          |            |          |           |             |           |            |          |
| A4 Women should wear a hijab ...never jeans or revealing clothing outside their home |          |            |            | 10       |           |             |           |            |          |
| F5 A conservative follower of Islam ... follows all 5 pillars of Islam..visits Mosque regularly |          |            |            |          | 8         |             |           |            |          |
| B3 Worries about anti-Islamic policies |            |            |            |          | 8         |             |           |            |          |
| D5 Islamic law has higher precedence ... should replace the legal system in use today |            |            |            |          | 8         |             |           |            |          |
| A3 Women should wear a hijab ...& clothing which fully covers them |          |            |            |          | 8         |             |           |            |          |
| C1 No friends |            |            |            |          | 8         |             |           |            |          |
| F3 Prays when convenient ... visits Mosque only on important days of the Islamic year |            |            |            |          | 7         |             |           |            |          |
| E5 Homosexuals and adulterous women ... should be stoned |            |            |            |          |           | 13          |           |            |          |
| E6 Apostates.. threats to Islam and caliphate ... must be slain |            |            |            |          |           | 13          |           |            |          |
| A5 Women must wear a hijab at all times.. no make-up..stay away from westerners ... beaten if they disagree |            |            |            |          |           | 11          |           |            |          |
| A6 ‘Women who don’t wear a hijab or burqa ... or wear revealing clothing... nothing more than sex slaves’ |            |            |            |          |           | 8           |           |            |          |
| B2 Accepts.... people doing violent acts towards others |            |            |            |          |           |             |           |            | 8        |
| E3 Polygamy is permitted ... Muhammad had multiple wives |            |            |            |          |           | 7           |           |            |          |
Table 4  Models linking the elements to the selection of emotions for Muslim respondents. Only selections with coefficients of 7 or higher are shown

| Self-Defined as Muslim | E1 ACHIEVE | E2 BELONG | E3 EMPOWER | E4 ENGAGE | E5 ESTEEM | E6 IDENTIFY | E7 MASTER | E8 NURTURE | E9 SECURE |
|------------------------|------------|-----------|------------|-----------|-----------|-------------|-----------|------------|-----------|
| A4 Women should wear a hijab …never jeans or revealing clothing outside their home | 7 |
| E2 There is one God (Allah) … Muhammad is his messenger | 9 |
| D2 Does best not to eat pork or drink alcohol | 9 |
| B4 Victim of persistent aggression | 8 |
| F3 Prays when convenient … visits Mosque only on important days of the Islamic year | 7 |
| A2 Women may wear open sleeves and above the knee shorts … nothing beyond that | 7 |
| D6 Those who do not follow all of the Islamic laws.. are non-believers … punished in the ‘afterlife’ | 7 |
| A6 ‘Women who don’t wear a hijab or burqa … or wear revealing clothing… nothing more than sex slaves’ | 7 |
| A5 Women must wear a hijab at all times.. no make-up.. stay away from westerners … beaten if they disagree | 7 |
| D3 Believes in the 5 pillars of Islam | 7 |
| B2 Accepts….. people doing violent acts towards others | 7 |
| F6 Follows all 5 pillars of Islam … rejects other faiths & modern culture | 7 |
| E4 Strictly against gambling… intoxicants …. polytheism | 7 |
radicalized; Rate 1 = very low probability of being radicalized). We show the additive constants and only the elements with a positive coefficient of 6 or higher for the data.

Table 2 shows us that:

1. The additive constant is low, except for the highest value of 30. Note that the respondent is unable to consciously set the additive constant. The additive constant emerges from the data. Thus, we conclude that as a baseline, all groups of respondents feel a low likelihood of radicalization, but the highest group to sense a possible radicalization are the Muslim respondents.

2. Non-Muslims show the absolutely lowest additive constant (4), vs the additive constant shown by the Muslim respondents (additive constant of 30).

3. It is in the pattern of responses to the elements that we see remarkable patterns emerging. Males and females respond to the typical elements that we would associate with radical Islam (martyrdom, stone homosexuals, slay apostates).

4. When we compare non-Muslims to Muslims, we see that non-Muslims are sensitive to these elements, whereas Muslim respondents show no clear differentiation among the elements. It is the baseline which is high. This is a totally unexpected finding and deserves further exploration.

5. The additive constants for Rate 1 (no radicalization) are low and similar to each other (13–21). Not so for the additive constant for Rate 9, when comparing non-Muslims (additive constant = 4) and Muslims (additive constant = 30).

Results from Models for Emotions

The subsequent analysis creates models for the nine emotions. The approach is similar to the first analysis but creates nine new binary variables, one for each emotion. An emotion is given the value 100 for a vignette when selected for that vignette, and the remaining eight vignettes that were not selected are given the value 0. Once again, a tiny random number is added to each of the nine newly created binary variables. The magnitude of the random number is so small as not to affect the coefficients materially.

The model is expressed as the same weighted linear function as before, except that no additive constant is estimated. Leaving out the additive constant makes comparing coefficients more accessible within and across emotions and groups.

Table 3A shows the models for the non-Muslim respondents, and Table 3B shows the models for the

| Binary Variable Rate 9—Definitely Radicalize | Tot | Two MS | Three MS | Four MS |
|--------------------------------------------|-----|--------|----------|---------|
| Base                                        | 227 | 91     | 136      | 100     |
| Additive constant                           | 17  | 15     | 18       | 1       |
| A5  | Women must wear a hijab at all times... | 10  | 18     | 11       | 18     |
|     | no make-up... stay away from westerners... | 13  | 10     | 13       | 17     |
|     | beaten if they disagree                  | 7   | 6      | 7        | 7      |
| A6  | ‘Women who don’t wear a hijab or burqa... | 6   | 9      | 6        | 9      |
|     | or wear revealing clothing...             | 9   | 8      | 9        | 8      |
| B2  | Accepts... people doing violent acts towards others | 6   | 6      | 6        | 6      |
| C6  | Opposes... liberal Muslims, gay people and members of other religions | 7   | 15     | 11       | 18     |
| E1  | To die as a martyr... greatest way to serve Allah | 10  | 15     | 11       | 18     |
|     |               | 17  | 15     | 11       | 18     |
|     |               | 13  | 13     | 13       | 17     |
|     |               | 7   | 6      | 7        | 7      |
| E5  | Homosexuals and adulterous women... should be stoned | 6   | 9      | 6        | 9      |
|     |               | 13  | 13     | 13       | 17     |
|     |               | 7   | 6      | 7        | 7      |

| Binary Variable Rate 1—Definitely Not Radicalize | Tot | Two MS | Three MS | Four MS |
|-------------------------------------------------|-----|--------|----------|---------|
| Additive constant                               | 16  | 30     | 7        | 10      |
| A1  | It’s irrelevant what women wear              | 9   | 6      | 9        | 8      |
|     |     | 7     | 11      | 14      | 19      |
| C2  | Has Friends in both the gay community... and from many religious backgrounds | 8   | 8      | 8        | 11     |
Muslim respondents. Only coefficients of 7 or higher are shown to allow the patterns to emerge.

1. The non-Muslim respondents emerge with 17 elements strongly driving three emotions (belong, identify master, and one element driving the selection ‘esteem’)
2. The Muslim respondents emerge with 13 elements, all but one driving one emotion (secure)

Uncovering Latent Mindsets in the Population from the Patterns of Coefficients

A continuing organizing principle of Mind Genomics is the discovery of new-to-the-world mindsets, groups of individuals showing similar patterns of responses to the elements tested. These mindsets appear, again and again, transcending the usual ways of classifying individuals. Furthermore, the mindsets emerge from purely mathematical considerations instead of prior beliefs about the world’s organization.

Mindsets have emerged in all sorts of studies, ranging from product design, both foods, and non-foods, including credit cards (Moskowitz and Gofman 2007), to health behaviors such as the type of messages to which people will respond to live a healthier life (Gabay and Moskowitz 2019), in evaluating the effects of COVID-19 in the tourism industry (Papajorgji et al. 2021) to name a few. Mindsets appear in the world of the law (Moskowitz et al. 2020). The fact that there are no mindsets for murder suggests that murder may be the only topic where there does not seem to be legitimating ways of judging the same information, one leniently, one stringently.

At the start of this study, the assumption was that Mind Genomics might be able to pull out different mindsets for radicalization. The assumption was that there might be groups of respondents feeling that a person would be radicalized for various reasons.

The traditional approach to clustering respondents to identify underlying mindsets has been described in detail in other papers (Gere et al. 2017; Iollari et al. 2020; Todri et al. 2020) to mention a few. In this study, the objective was to cluster together respondents with similar patterns of perceiving radicalization similarly AND perceived non-radicalization similar, both simultaneously. This approach differs from the traditional approach, which is based on patterns generated by one scale only (e.g., similarity in patterns of radicalization only vs. joint similarity of patterns for radicalization AND non-radicalization).

Briefly, each respondent generates two models or equations, one relating the binary variable R9 to the presence/absence of the 36 elements and the other relating the binary variable R1 to the presence/absence of the elements. For both models, the estimation is done at the level of the individual, which was made possible by the permuted experimental design.

The above set of computations generates a data file of 227 rows, one per respondent. Two other data sets of 36 columns of data each are also created. The first data set is for the coefficients estimated for binary variable R9, and the second set is for the coefficients estimated for the binary variable R1. Each respondent thus generated 72 variables, taking 72 columns, with each column corresponding to an element. The data set is unwieldy at this point and may have a great deal of redundancy. A principal components factor analysis is performed on the 72 variables and 227 rows, with factors of eigenvalue 4 or higher retained. This calculation generated 17 such factors, which were rotated by quartimax rotation to simply the structure. Each respondent was now represented by 17 numbers, factor scores in the 17-dimensional space.

At the end of this process, clustering techniques were applied to the data to create two mindsets, three mindsets, and four mindsets, respectively. The clustering process was k-means with the distance measure between (1-Pearson correlation, Pearson R), computed on the 17 factors scores for each pair of respondents (Mucherino et al. 2009a).

Table 6 Models for two mindsets generated by clustering the patterns of emotional responses

| Mindset 1 based on the coefficient pattern for 9 emotions | Rate9 | Rate1 |
|---------------------------------------------------------|-------|-------|
| Additive constant                                       | 27    | 15    |
| E1 To die as a martyr.. greatest way to serve serving Allah | 9     |       |
| E5 Homosexuals and adulterous women … should be stoned  | 6     |       |
| E6 Apostates.. threats to Islam and caliphate …must be slain | 6     |       |
| Mindset 2 based on the coefficient pattern for 9 emotions | Rate9 | Rate1 |
| Additive constant                                       | 6     | 18    |
| E1 To die as a martyr.. greatest way to serve serving Allah | 12    |       |
| E5 Homosexuals and adulterous women … should be stoned  | 8     |       |
| E6 Apostates.. threats to Islam and caliphate …must be slain | 7     |       |
| B2 Accepts….. people doing violent acts towards others   | 6     |       |
Table 4 (top) shows the strong performing elements for the total panel (repeating part of Table 2), and then the strong performing elements for the two, three, and four mindsets. There are differences among the mindsets, but not dramatic ones, with radically different elements appearing in complementary mindsets. Rather, the situation is more of a degree. If we were to summarize the data by mindset, we would say it’s a matter of whether the mindset is likely to see most of the limited set of elements as drivers of radicalization or only a few. Indeed, only seven (and perhaps only six, without C6) can be said to be drivers of believed future radicalizability.

When looking at the bottom of Table 4, for the elements which signal no believed radicalizability, we see that only two elements signal inability to be radicalized, the first being indifference to women’s clothes, the second having friends in the gay community.

The same type of clustering can be performed, this time using a much larger matrix of 36 (elements) × 9(binary variables) or 324 variables, again subjected to a principal components factor analysis (Mucherino et al. 2009b) to generate 23 factors. Each respondent is thus located on 23 orthogonal new dimensions; the factor scores determine the location. To keep matters simple, the models are examined for binary variables Rate9 and Rate1, respectively, for the two mindsets or clusters emerging from the clustering. The clustering uses the pattern of coefficients from the data for emotions, but the models are estimated for Rate9 and Rate1, for both mindsets.

Table 5 suggests two patterns. Mindset 1 believes in a high probability of basic radicalizability (additive constant = 27), whereas Mindset 2 believes in a low likelihood of basic radicalizability (additive constant = 6). The elements are similar. Neither mindset believes in low radicalizability (additive constants 15 and 18, respectively). Table 6.

Discussion and Conclusions

The results of this study on extremism and jihad radicalizability depart dramatically from most of the Mind Genomics studies, and exploratory cartographies run during the past two decades. The lack of radical difference among groups based upon the pattern of coefficients is similar to what has been found only in one other case, murder, in a recently published book using Mind Genomics to explore legal issues (Moskowitz et al. 2020).

The second remarkable result is the clear differences between Muslims and non-Muslims in terms both of basic belief that the person described can be radicalized (non-Muslims believe it’s a matter of the specific elements; Muslims do not see dramatic differences among the elements, but rather believe in a high likelihood of radicalizability, based on the additive coefficient. The third remarkable result, again concerning Muslims and non-Muslims, is the pattern of linkages of elements to emotions. For Muslims, the primary relation is ‘secure’ (emotion 9). For non-Muslims, the primary linkages are to belong (emotion 2), identify (emotion 6), and master (emotion 7).

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