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The effects of COVID-19 preoccupation on business activity: A bounded rationality perspective

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Honors Thesis

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by

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Abstract

Using the unique conditions afforded by the global pandemic, we examine Simon's influential 1947 Bounded-rationality theory with empirical data. We attempt to correlate a shift in attention with a decrease in routine organizational activity. Using a relative measure for interest in COVID-19 topic prevalence from Google Trends and sales activity from a diverse sample of business to business companies. Our results support Simon's theory. We found a moderate relationship between routine activity and a global shift in attention. Furthermore, the data highlight a possible theoretical threshold necessary for an event to cause divergence.

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Introduction

In his 1947 book, *Administrative Behavior,* Herbert Simon proposed a refinement to the classical economic lens. Up to that point, economic theory had largely imagined the individual as a rational decision maker as the ultimate unit of analysis. Simon's idea was somewhat radical for the time. It came in two steps. First, individuals are not capable of absolute rationality (1947). Instead, individual rationality is bounded; an individual's capacity to know, absorb and process decision-oriented knowledge is fundamentally limited. Second, as a direct result of the first, individuals rely on organizational processes to simplify decision-making activity. Simon set aside traditional rational actor assumptions in favor of psychological and sociological theory that describe the capability of the decision maker to consume and digest information as limited (Cohen, Bingham, and Hallen 2018.).

Simply put, boundedly rational executives search for alternative solutions until the forecasted performance of an alternative exceeds aspiration levels (Simon 1955). However, like all people, executives are limited in their information processing abilities by fundamental cognitive limits as well as cognitive biases (Tversky and Kahneman, 1974; Kahneman, Slovic, and Tversky, 1982; Nickerson, 1998). The result is suboptimal solutions for executives and the companies they lead.

Since Simon's book, the Carnegie school has attempted to explain how organizations mitigate the limitations described by bounded rationality. (see Gavetti, Levinthal, and

Ocasio, 2007, for a complete review). The Carnegie school encompasses the following four theoretical pillars: bounded rationality, the role of specialized decision-making structures, the role of conflicts of interest and cooperation among organizational members, and routine-based behavior and learning (Gavetti, Levinthal, and Ocasio, 2007). The latter three are a response to the first.

"Specialized decision-making structures" can be as simple as hierarchy. Executives hierarchically subdivide tasks and information processing (Chandler, 1977). Such an arrangement allows individuals on lower levels to focus on the minutiae of their specific units' divisions and direct the attention of individuals higher in the hierarchy to focus on decisions that span their subunits (March and Simon, 1958; Sah and Stiglitz, 1986; Gaba and Joseph, 2013). Thus, the cognitive processing requirements for executives are reduced by adopting designs that promote specialization (Cyert and March, 1963; Grant, 1996).

In Nielson and Winter's view, Independent of organizational design, the tasks of business can be arranged in such a way as to promote routinization. Routinization allows complex but repetitive decisions to be reduced to a reusable checklist like structure. This reduces the cognitive load on decision makers and thus improves organizational efficiency through the mitigation of bounded rationality (1982). Gavetti, Levinthal, and Ocasio are careful to point out that the concept of routine as separate from decision making was not part of the original Carnegie School foundation. Instead, it is an outgrowth of Nelson and Winters (1982) influential interpretation. Nelson and Winters advocate the routine as the fundamental unit of analysis whereas the Carnegie School advocates the firm as the fundamental of analysis. The routine-based behavior pillar of the Carnegie School then,

focuses on the standardized practices, programs, and operating procedures that serve to economize bounded rationality (Gavetti, Levinthal, and Ocasio, 2007).

Two of these pillars are of the most interest in this study; namely, bounded rationality and routine-based behavior and learning. As has been previously established, the routine-based behavior of the firm is a direct response to the bounded rationality of the firm. Indeed, the business of the firm has been designed in such a way as to promote routine and thus minimize the cognitive load placed on individuals (Simon 1947). The Carnegie School typically views this interaction as a point in time, observing the momentary relationship between the two (March 2006). Nelson and Winter take a characteristically evolutionary view of the firm (1982).

The difference between these views may seem slight, but the consequences are significant. The Carnegie school has been examined for decades to tease out the nuance of the theory, but, like most behavioral sciences, has suffered somewhat from a lack of empirical data due to the absence of experimental conditions (Barros 2010). Even pseudo experimental conditions have been largely denied to The Carnegie School because of its point-in-time nature. However, if a globally attention demanding event were to occur and then decline in a measurable way, the Carnegie school concept of bounded rationality mitigated through routines could be observed on a time dependent (rather than point-in time) scale. Such an event would allow scholars to observe the change effects of increased attention demand on the routines of organizations.

Bounded-rationality theory would predict that as individuals within organizations split their attention between their regular routines and an external event, internal activity (as

distinct from productivity) would decrease. The COVID-19 pandemic affords such an opportunity.

Given these outlined pillars of the Carnegie School, we hypothesize that an increase in attention to the COVID-19 pandemic is negatively correlated with volume of business communications. The causal mechanism is described as follows. Actors in the business world regularly spend a significant portion of their attention (a finite quantity as defined by Nelson and Winters) on initiating and following through with business communication. When an outside force, COVID-19, demands the actors' attention, their attention will shift to the outside demand. Consequently, the overall volume of sales communication will fall.

As a moderating variable, we will consider cumulative COVID-19 cases. We reasonably assume that the number of cases may have some relation to both attention as measured by google trends and the volume of sales conversations. However, once the initial attention shock dissipates, we do not expect that cases will dissipate. Thus, the trend of communication after the attention shock wave will be most indicative of Simons theory. Specifically, we predict that sales communication volume will converge towards pre pandemic levels regardless of the increasing number of cases.

Methodology

The attention of an organization is assumed to be a construct with a finite quantity as defined by Bounded-rationality theory. A significant disturbance, internal or external, requires the attention of the organization. The diversion of that attention leads to a decrease in the normal activities of an organization as routines are disrupted (reducing the

quantity of available attention) and attention is further diverted towards the disturbance. The greater the quantity of attention drawn by the organization, the greater the resulting decline in normal activity.

In the Case of the COVID-19 pandemic, the magnitude of the disturbance is measured using google trend analytics as an approximation. It is assumed that an increase in topic interest as measured by google trends indicates a realignment of attention. As trend analytics are not available at an organizational granularity, the data was collected for a country wide population. Routine organizational activity was crudely approximated using online sales activity from a diverse set of five business to business companies.

Given these assumptions, Bounded-rationality theory predicts a negative relationship between google trend analytics and online sales conversations between businesses.

The Data regarding online intra business communication was captured by Chatfunnels, a chat sales automation company cooperating with the research. Each of the client companies measured were business to business companies with a diverse set of operations including Operations Automation, Web Operations, IT Asset and Service management, and Marketing, each with a broad and extensive client base. The variety of industries was selected to give the broadest possible exposure to the activities conducted within a business to examine the impact of attention depletion holistically. The data was recorded comprehensively on a daily basis from January of 2020 to July of 2020. It includes the following fields: Users, Conversations, Email Captures, and Total Meetings booked.

The “users” field indicates the number of web users visiting the client companies’ site in a given day. One user was only counted once per day regardless of how many times, or how long, the user visited on that day. Unique visitor status was determined by IP address. The “conversations” field indicates the number of conversations had between any bot made by Chatfunnels for the client and an onsite user. One user could trigger multiple conversations, meaning if only one user visited the site that day on 2 occasions and started 2 conversations, the conversations field would be “2” while the users field would be “1” for that day.

The “Emails Captured” field indicates the number of unique email addresses captured on that day. Duplicate email addresses were not counted beyond their first appearance. This field helps approximate the effectiveness of the higher-level activity (Conversations and Users). Total Meetings Booked indicates the number of Meetings booked in a given day. Rescheduled, and cancelled appointments were excluded from the totals.

Data regarding the COVID-19 pandemic was drawn from two places, Google Search Trends and The European Center for Disease Control (ECDC). Google Search Trend data provides a relative measure of a topic's “trend” on a scale of 0-100. A 100 indicates peak interest in the topic and a zero indicates minimal interest in the topic. The scale is linear. For this study, the topic chosen was “COVID: Virus”

The ECDC provided data that was comparable with data publicly available through Johns Hopkins. ECDC data, as opposed to WHO or U.S. CDC data, was selected as a matter of convenience. We have no reason to believe that an examination of other data sources would yield significantly different results.

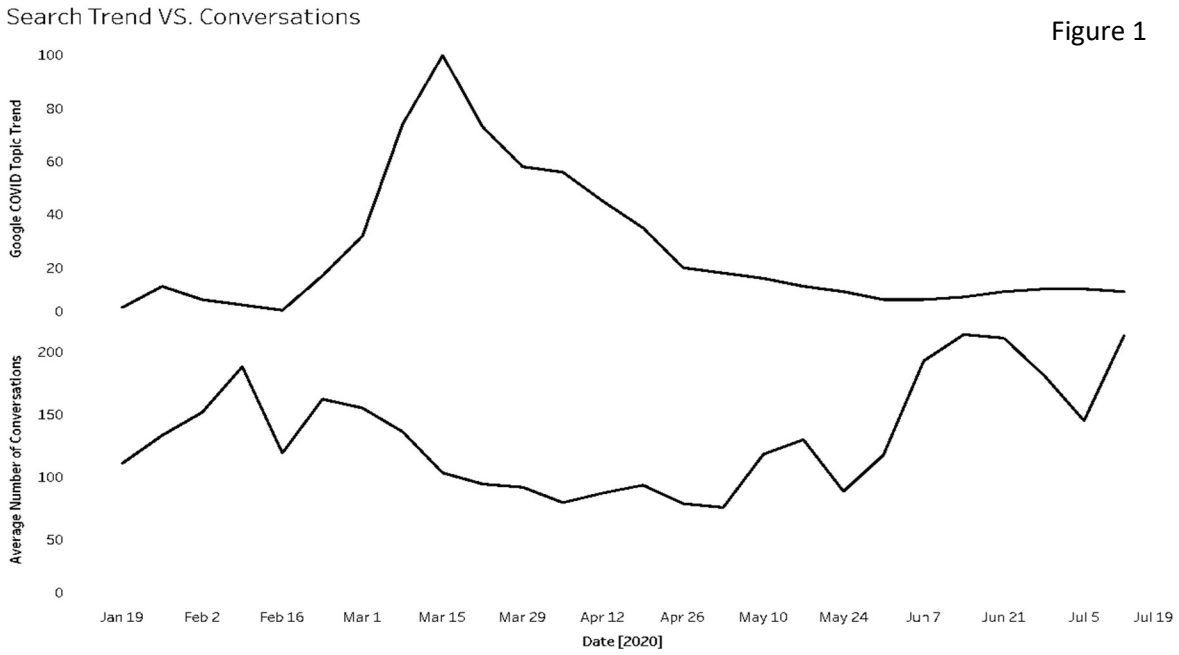
Limitations

It should immediately be noted that the results of this study are necessary but not sufficient to demonstrate the validity and predictive power of Bounded-rationality theory. The likely presence of lurking variables that cast doubt on the significance of the correlation is acknowledged. However, many of the most obvious moderating variables are assumed to contribute to the attention spike. For example, the impact of decreased consumption can be partially attributed to the disintegration of routine and the introduction of additional attention demands. Still such variables as government mandated shutdowns have not been fully explored in this analysis.

Results

A time series analysis quickly reveals the existence of a negative relationship between conversations and COVID-19 topic trend as seen in figure 1. The highest point of attention interest corresponds with the depression in conversation statistics. Similarly, a slight uptick in topic interest towards the beginning of July again correlates with a decrease in conversations.

Figure 1



While a completely causal inference is beyond the scope of this study, it should be noted that the actual presence of the pandemic (As measured by new daily cases) does not account for a decrease in conversation activity, as seen in figure 2. A high P value (0.31) gives ample reason assume any observed correlation is due to chance.

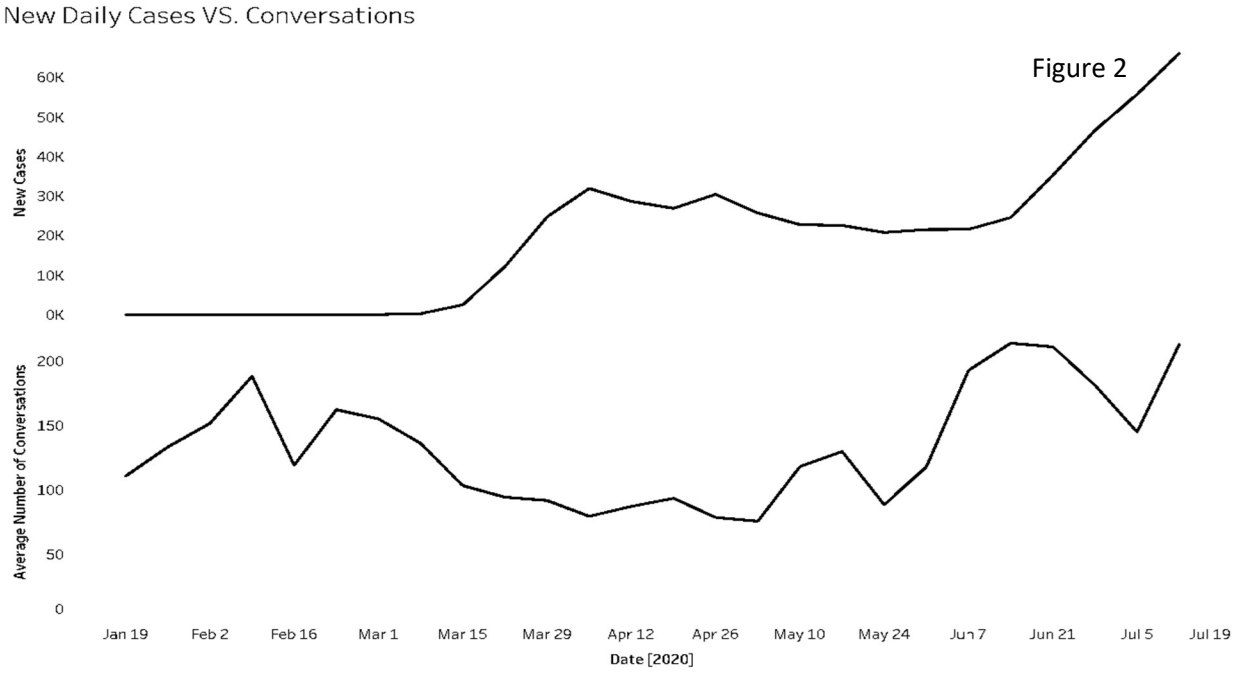


Figure 2

The Exact nature of the relationship between Conversations and Topic Trend can be better inferred using a scatter plot as seen in figure 3.

A moderate degree of heteroscedasticity indicates that a raw regression analysis would prove somewhat flawed for this data, particularly when interpreting points with a lower trend ranking. However, a regression analysis yields an r^2 value of 0.192 and a p value of 0.020 indicating a moderate relationship.

Figure 3

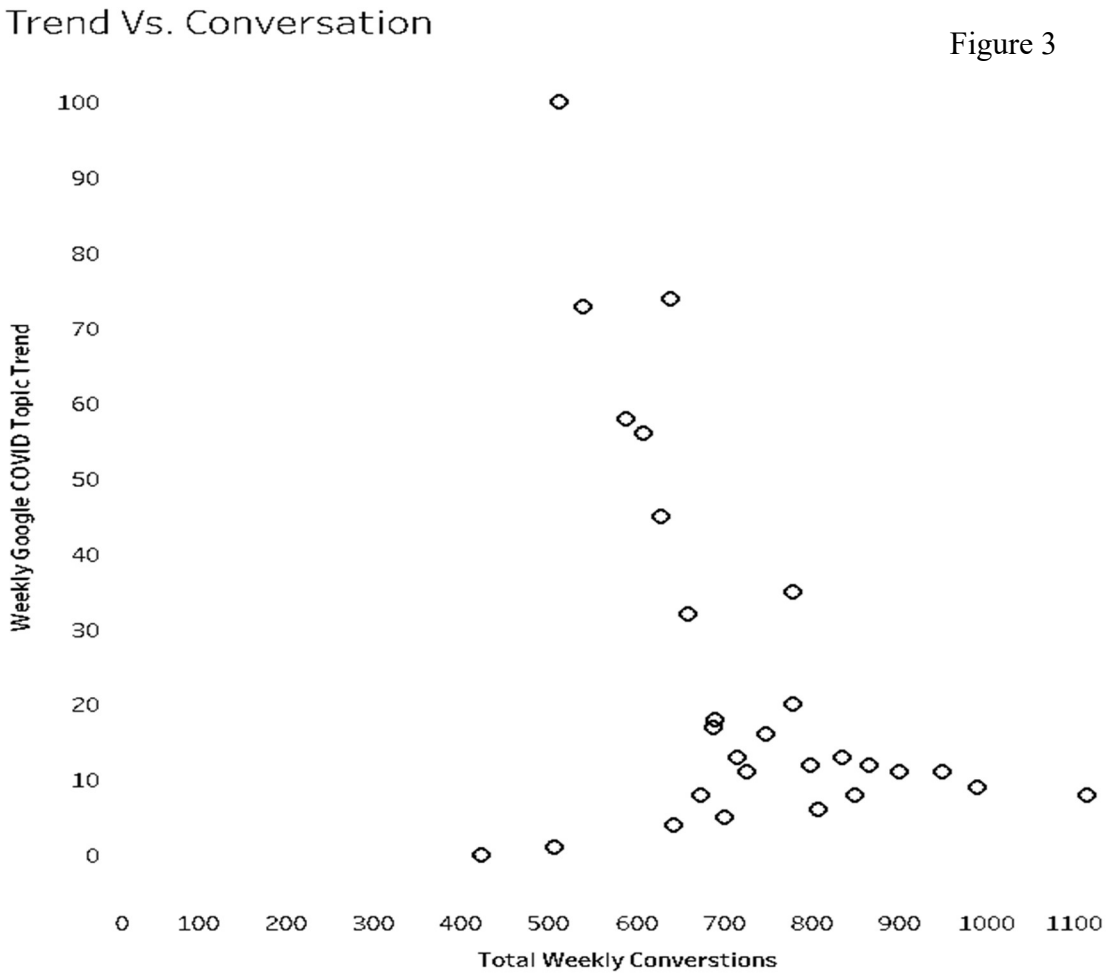
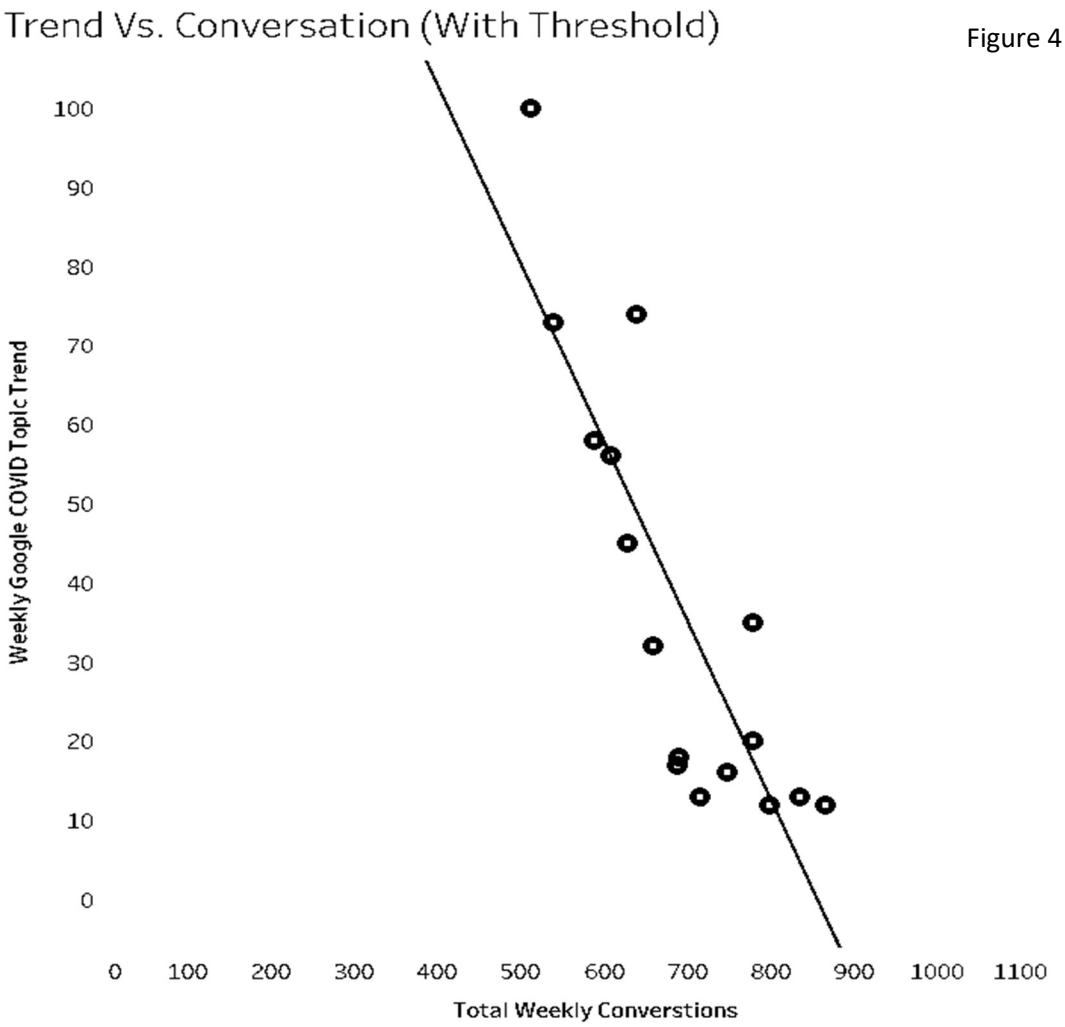


Figure 4



A threshold that excludes weeks with minimal COVID-19 interest trend (<12) yields a much stronger result (figure 3) r^2=0.723 and p=<0.0001 as seen in figure 4.

Discussion

These results correspond with the prediction of Bounded rationality theory. Our hypothesis is largely validated. The data indicate that across a broad range of companies and industries attention was diverted by the COVID-19 pandemic resulting in aggregate reduced activity within the organizations. Furthermore, the results indicate that the

relationship between sales conversation and Interest in COVID is not due to the presence of the pandemic as a lurking variable.

Perhaps the most interesting finding in our data is the existence of an attention threshold. While a moderate relationship exists for unfiltered data, the relationship becomes much stronger once the Google Trend strength reaches 12. In fact, with a trend strength of less than 12, there appears to be no relationship between attention and business communications($p=.09$). This suggests the existence of not only an empirical barrier, but a psychological barrier. It seems that only events that diverge significantly from the undercurrent of attention demanding events and activities have the power to noticeably shift core business trends. Further research defining what makes an event attention worthy is needed.

The data leave several questions unanswered and raise several more. A study that could introduce additional control and moderation variables could be helpful in detecting a more clearly defined causal relationship between the two. Due to a limited sample size, we were not able to examine the variation in impact between industries and geography. A larger and more detailed data set could yield more conclusive results.

Conclusion

Based on theory developed by Herbert Simon, the Carnegie School, and Nelson and winters, we undertook a study to empirically demonstrate the validity of bounded rationality theory. Data was drawn from digital sales activity of five companies catering to a wide variety of organizational clients. This data was correlated to topic trend results from Google Trends for the COVID-19 topic. We found that the topic Trend results can partially explain the change in sales activity. Applying a threshold to the data makes the relationship much stronger. Our results affirm the validity of Simon's bounded rationality theory. While further examination is needed to explore the empirical nuance of theory, it is clear that an attention-based theory can effectively explain the observed decrease in organization activity.

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