Investigating the impact of social comparison on attentional control strategy

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Undergraduate Research Thesis

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April 2022
Abstract

If you were at the grocery store looking for your favorite type of cereal, how would you choose to search for it? Although we may utilize a strategy to find the box more efficiently, such as only looking for features unique to it, research has shown we are often suboptimal in the search strategies we choose. Crucially, optimality requires effort not everyone is motivated to expend. However, social comparisons, which compare one person to another, can motivate task improvement, though it is unclear if this can translate to strategy use during visual search tasks.

As a result, we explored whether upward or downward social comparisons could increase optimal strategy use by modulating motivation to expend effort. In the present study, we employed the Adaptive Choice Visual Search (ACVS), one task designed to measure strategy choices during visual search (ACVS; Irons & Leber, 2016). We randomly assigned online participants to one of three possible conditions: an upward, lateral, or downward comparison condition. At the halfway point of the ACVS, we compared participant reaction times to a bogus peer average that framed participants as slightly slower, about the same, or slightly faster, respectively. Our results showed no significant difference in optimality between conditions. However, it is possible the ACVS, as well as our experienced online participants, were not best suited for these manipulations. Although we found no evidence that social comparisons influence strategy use, future work may explore in-person data collection, as well as other visual search tasks, to investigate if any interactions do exist.
Investigating the impact of social comparison on attentional control strategy

When scanning a crowd for a familiar face, how do you parse through the sheer amount of visual information surrounding you? Research has shown individuals often use search strategies to selectively direct attention to meet search-specific goals (Folk et al., 1992; Irons & Leber, 2020). In this case, you may only look for people with the same hair color as your friend, reducing how difficult it is to search through the entire crowd. Since it is impossible to process everything in a scene, the ability to strategize and prioritize—to only look for people with your friend’s red hair, for example—can be useful in managing the immense number of competing items we regularly encounter (Wolfe & Horowitz, 2017). As much of visual life organizes around this assumption that individuals can control their attention and deploy it in meaningful, goal-oriented ways, strategies can help us meet these challenges with efficiency. However, we have also found that individuals are often suboptimal, or not efficient as they can be, with the strategies they do choose (Irons & Leber, 2016). That is, if observers have multiple strategies available to them, they are not always motivated to use the one that best optimizes performance. As a result, we seek to understand what may motivate individuals to improve their strategy use during visual search.

Strategies may not be wholly independent of outside influence, as how we approach daily life is also influenced by the information we receive from the world around us. For example, research on cognition has suggested that cultural differences may reflect in some aspects of visual perception such as attention allocation, use of context, and search efficiency (Alotaibi et al., 2017; Norenzayan et al., 2007; Ueda et al., 2017). This view of cognition as an influenceable process recognizes the impact environments can have on the way individuals receive information, process it, and use it moving forward. Likewise, decades of research within the field
of social psychology have shown that social environments can influence affect, behavior, and cognition in pervasive ways (Bandura, 1991; Petty & Briñol, 2015; Yamin et al., 2019). One area of interest within this larger social psychology field is the social comparison. Though comparisons have been shown to be powerful motivators, it is unclear whether they can influence strategy use as well.

**Social Comparison and Motivation**

Social comparison, or the process of comparing information about others in relation to the self, is one way individuals use information from their environment to both consciously and unconsciously self-evaluate (Festinger, 1954). Festinger’s initial Social Comparison Theory suggested that social comparisons are impactful because they establish appropriateness and worth, or a person’s standing, amongst their peers. Essentially, without gaining context from others, individuals may find it difficult to benchmark their abilities or maintain a stable view of the self (Corcoran et al., 2011). Indeed, individuals tend to compare themselves to those of similar standing, such as their co-workers or friends, to obtain a more accurate assessment of any similarities or differences they may possess (Corcoran et al., 2011; Gerber et al., 2018; McIntyre & Eisenstadt, 2011; Miller, 1982; Suls et al., 2002). In this way, individuals can determine where, or how, they fit in and relate to their social groups. However, this is not always the case; besides self-evaluation, individuals may have different, changing motivations for comparing themselves to others.

Sometimes less straightforward, social comparisons can also be an important way to fulfill psychological needs other than self-evaluation, such as self-enhancement and self-improvement (Corcoran et al., 2011). For example, if one person feels threatened by a poor test grade, they may self-enhance by comparing themselves to someone who did relatively worse.
This is referred to as a downward comparison (Wills, 1981). If another person aims to self-improve, they may compare that same grade to someone who did relatively better. This would be referred to as an upward comparison (Wheeler, 1966). Accordingly, individuals may utilize social comparisons (or underutilize them) to reach different motivational goals, such as preserving self-competency, improving through emulation, or simply maintaining a current affective state (Corcoran et al., 2011).

However, despite existing motivations, individuals do not always get to choose who they are compared to. In real-world contexts, a boss may compare one employee’s performance with another’s, or a parent may compare one child’s grades to an older sibling’s. Since social environments are not passive, and often contain more than one actor, they can impact individuals even when comparisons have not been explicitly chosen (Wood, 1989). As a result, past research has shown that both upward and downward comparisons, even when forced, have the capacity to influence motivation within real-world settings as well as during more menial experimental tasks.

**Upward Comparisons**

Upward comparisons, or those that compare one person to a superior other, can increase motivation to achieve task-specific goals. In line with self-improvement motivations, individuals may be more inclined to aim upward than downward because this aligns them, or the self they want to become, with those better off (Collins, 1996). In this way, upward comparisons may be most effective when future action is seen as contributing to a certain goal, such as achieving what a “superior other” has already accomplished (Fishbach et al., 2010). For example, Rancourt et al. (2014) found that dieters compared to thinner individuals made better exercise choices than those who were compared to heavier individuals. In this case, upward comparisons motivated
dieters to further diet-related goals, and their actions (more exercise) directly contributed to reaching those goals (weight loss). They have also been found to motivate healthier parenting (Rheu et al., 2021), employee performance (Gino & Staats, 2011), competitive behavior (Garcia et al., 2013), and improvement in many other real-life domains.

Within a less personally relevant setting, Huguet et al. (1999) found that forced upward social comparisons also improved performance on the Stroop task, which requires participants to resist word retrieval in favor of identifying a word’s physical color. Particularly, participants who believed their performance to be slightly worse than their coactor, even when the coactor was not physically present, responded faster despite the effort required to suppress dominant word retrieval processes. This experiment, as well as its follow-ups, suggest social comparisons may influence how motivated participants are to improve on even more demanding cognitive tasks, including how well they are able to focus their attention to achieve these task-relevant goals (Augustinova & Ferrand, 2012; Dumas et al., 2005). Notably, upward comparisons can drive individuals to improve on a wide range of tasks, both real-world and experimental.

At the same time, upward comparisons have the capacity to demotivate individuals if they are too steep (Seta et al., 1991). Specifically, if a target’s performance is deemed unachievable, upward comparisons may demotivate individuals from engaging further, as unachievable targets may not only seem pointless to compete with, but threatening to self-competency. Following these comparisons, performance may stagnate, or even decline, as a result (Chan & Briers, 2019; Gilbert et al., 1995; Seta et al., 1991; Tesser, 1988). For this reason, comparisons with unreachable, superior others are typically avoided when seeking to motivate performance. In contrast, forced but slight upward comparisons, when perceived as achievable,
may motivate individuals if future effort is seen as a viable way to progress toward task-relevant goals (Fishbach et al., 2010).

**Downward Comparisons**

However, downward comparisons, or those that compare one person to an inferior other, can also increase motivation to improve. In one study by Fishbach et al. (2006), individuals who were told they exercised more than others were more interested in eating healthy than those who were told they exercised less. Importantly, this was only the case when their larger health goals were emphasized. In comparison, when those in the downward comparison were not reminded of their larger health goals, they were less interested in healthy eating. Accordingly, Fishbach et al. (2010) suggest that downward comparisons increase motivation only when additional action is perceived as further commitment to a goal. While downward comparisons can make tasks more enjoyable and increase short-term mood, they can also lead to inaccurate perceptions of task completion if no larger commitment exists, also referred to as “coasting” (Carver & Scheier, 1990; Diel et al., 2021). Indeed, if happier participants are told to stop a task when they feel they have performed adequately, they are faster to quit than neutral or sad participants (Hirt et al., 1996). As a result, whether downward comparisons increase motivation may depend on an individual’s perception of the comparison, particularly whether further participation is seen as commitment to a larger goal or simply unnecessary.

Since first being defined, social comparisons have proved to be more complex and widespread than Festinger originally theorized (Buunk & Gibbons, 2007). Though past research has suggested both upward and downward comparisons can increase motivation to improve under different circumstances, it is unclear whether social comparisons can improve how individuals employ strategies during visual search tasks. We explore this possibility with a
paradigm used to measure strategy use during search: the Adaptive-Choice Visual Search (ACVS; Irons & Leber, 2016).

**The Adaptive-Choice Visual Search**

The Adaptive-Choice Visual Search (ACVS) is one task useful for measuring strategy choice during visual search (ACVS; Irons & Leber, 2016). During the ACVS, participants must find one of two numbered targets per trial (a red and a blue square) among a larger display of numbered blue, red, and green colored distractor squares. For this task, both the blue and the red target contain a number 2-5, while all irrelevant blue, red, and green distractor squares contain a number 6-9. Since both targets are always present in each trial, participants can choose which color they would like to search for. This allows us to analyze what strategies observers prefer based on which target they select, how often they switch targets, and how efficient they are overall with their target selection (also known as their optimality). Although observers have a few different strategies they may prefer to use during this task, such as random searching or committing to search for only one target, the optimal strategy is the most efficient way of completing the ACVS.

The ACVS is based on the “subset search,” where searching through a smaller subset of items is more efficient than addressing the entirety of a display (Egeth et al., 1984; Green & Anderson, 1956). Accordingly, to search optimally on the ACVS, participants must first assess the display before conducting a subset search through the less numerous target color. For example, if there are fewer red squares than blue in the display on a given trial, the optimal search strategy would be to only search through the red squares for the red target, as there are fewer total squares to search through. Through this paradigm, Irons and Leber (2016) found that
participants are often suboptimal with their search behavior, even though using the optimal strategy is the quickest method of completing this task.

One possible explanation for suboptimal strategy choice is effort avoidance. Irons and Leber (2018a) found that optimal strategy use was not correlated to metrics such as cognitive ability or ability to control attention, but how subjectively effortful observers perceived the optimal strategy to be. During cognitively demanding tasks, observers are not always motivated to expend additional effort to use an optimal strategy, especially if they see no meaningful reason for doing so (Boot et al., 2009; Egeth et al., 2010). In this way, individuals may avoid expending effort until they are sufficiently motivated to do so (Botvnick & Braver, 2015). These findings suggest that if participants are motivated to expend more effort on this task, they may utilize the optimal strategy more often, improving overall search performance on the ACVS.

Despite the field’s long history, it is unclear whether social comparisons can influence strategy use during visual search tasks. As the ACVS paradigm provides a way to examine strategy choices in an effortful, changing environment, it would be useful to test how comparisons may influence performance. If social comparisons can motivate individuals to improve on this task, we may better understand which factors contribute to the use of optimal search strategies in more dynamic search contexts.

The present research aims to explore whether social comparisons can increase search optimality in ways that have been previously underexploited within the visual search and social psychology literatures. Previously, we have hypothesized that some individuals search suboptimally because they seek to avoid the cognitive effort needed for optimal performance. To be optimal in the ACVS, participants must first determine which target color has the smaller subset to search through, as searching through fewer targets results in a faster search.
In the present study, participants completed the Adaptive-Choice Visual Search task (ACVS; Irons & Leber, 2016) in one of three randomly assigned conditions: an upward, lateral, or downward social comparison condition. In between blocks, participants had their average response times on the ACVS compared to a bogus participant average to manipulate perceptions of relative performance on the task. After completing the ACVS, participants then answered two open-ended survey questions. The first gauged perceptions of how much the comparison did or did not motivate them to try harder in the second half of the task. The second survey question allowed them to provide any additional insights they had about the study.

First, we considered the possibility that upward social comparison either does or does not motivate better strategy use. If upward social comparison does motivate better strategy use, then presenting bogus response times that are faster than the participants’ averages will lead to greater optimality during the second half of the ACVS task. Alternatively, if upward comparisons do not motivate better strategy, we will see no improvement. Likewise, if downward social comparisons motivate better strategy use, presenting bogus response times that are slower than the participants’ averages will lead to greater optimality in the second half of the ACVS. However, if downward comparisons do not motivate better strategy use, we expect to see no improvement.

Although the effect of comparisons on search strategy is largely unknown, we predict that, between these alternatives, participants given slight upward comparisons (i.e., told they are slightly slower than their peers) may be motivated to expend more effort than those in the downward condition. We might expect upward comparisons to lead to higher optimality than downward comparisons because past research has suggested upward comparisons may relate more directly to improvement, rather than enhancement, motivations (Buunk & Gibbons, 2007; Diel et al., 2021). Specifically, those who believe they are doing worse have a direct reason to try
harder (i.e., to improve), while those who believe they are doing better may begin “coasting” if further effort is seen as unnecessary. As a result, we may expect participants in the upward comparison condition to have a higher proportion of optimal search trials overall when compared to the downward comparison condition.

**Method**

**Participants**

A total of 171 participants completed this study. After excluding data from 20 participants whose mean accuracy was below 80%, as well as those whose average reaction time was more than three SD below the group mean, we ended with 151 participants total. We excluded the final participant we ran to meet our final sample of 150 participants (59 female, 84 male, 4 nonbinary, and 3 unknown) aged 19 to 40 ($M = 30.38$) as determined by our preregistration at https://osf.io/w8tsk. Our final sample size left us with 50 participants in the upward comparison group, 50 in the lateral comparison group, and 50 in the downward comparison group. We have not previously tested these conditions and chose 50 to provide estimates of the relevant effect sizes. Although our preregistration stated we would collect data in person, the COVID-19 pandemic hindered our ability to do so. As a result, we recruited all participants through Prolific, a crowdsourcing platform for collecting online subject data. All participants reported normal or corrected-to-normal visual acuity and normal color vision before completing the task. Participants received compensation for their time through the Prolific website and were debriefed after completion.

**Materials & Procedure**

Participants completed the ACVS online on their own computer monitors. The stimuli were based on Irons and Leber (2018a, Experiment 2). In this version of the task, the display
contained 54 squares (measuring 1° x 1°) with 13 blue (RGB: 0, 0, 255), 13 red (RGB: 255, 0, 0), 14 green (RGB: 0, 150, 0), and 14 variable (either red or blue) squares in the display. These items were arranged in three concentric rings around a central fixation cross. The innermost ring contained 12 squares, the middlemost contained 18, and the outermost contained 24 (with distances from the fixation point measuring 6.3°, 9.4°, and 12.4° respectively). In half of trials, the variable distractors (the 14 variable squares) were red and in the other half the variable distractors were blue. In other words, in half of trials there would be more red squares than blue in the full display, and vice versa. Short runs of 1-6 trials with red variable distractors were interleaved with short runs of 1-6 trials with blue variable distractors.

During task instruction, we explicitly told participants to search for one of two targets per trial. These included both a red and a blue square containing a digit between 2-5 (all other red, blue, and variable squares contain digits between 6-9). We informed participants that two targets appeared on every trial and that they were free to search for whichever they choose, as both would always be correct. Participants responded using keys V, B, N, and M corresponding to each of the possible target digits 2, 3, 4, and 5. We restricted response time to 10 seconds per trial.

**Figure 1**

*The Adaptive-Choice Visual Search (ACVS)*
Note. One possible trial that could appear during the Adaptive-Choice Visual Search (Irons & Leber, 2019). In all trials, there are two targets. These include both a red and a blue square numbered 2-5. Although participants are free to look for either target per trial, the fastest way to complete this task is to conduct a subset search through the less numerous target color. This is the optimal, or most efficient, strategy. In this trial, the optimal choice would be to search through only the blue squares for the blue target, rather than through the red squares for the red target, as there are fewer total squares to search through.

After receiving instruction, participants completed 10 practice trials followed by 4 blocks of 84 trials with short, self-paced breaks in-between. In this version of the experiment, we gave participants 1 s color previews of the display squares before any numbers appeared. In past online versions of this experiment, we have done this to encourage optimality (Hansen et al., 2019; Irons & Leber, 2018b). Specifically, previews allow participants to quickly appraise the display before they begin searching for a target. Since online participants are often less optimal on the ACVS than in-person participants, our hope is that previews will boost online optimality to resemble in-person data more closely (McKinney et al., 2020).
At the halfway point of the experiment, after block 2, each participant was shown their average response time (RT) as well as a bogus past participant average. Participants in the upward comparison condition received on-screen feedback that their peers averaged (RT*0.80). For example, if the participant’s average RT was 3.5s, the comparison given would be 2.8s. Those in the lateral condition received on-screen feedback that the average response range was (RT*0.95 – RT*1.05). Those in the downward condition received on-screen feedback that the average was (RT*1.20). After receiving this comparison, participants completed the second half of the study, which was the same as the first half before the comparison.

Following the last block, an on-screen debrief explained the deception. Before exiting, participants completed two open-ended questions. First, we asked them if they believed the social comparison motivated them to try harder, try less, or try about the same as they did in the first part of the study. Secondly, participants shared any additional insights they had about the study. After completing the survey, participants concluded the experiment.

**Results**

For the following analyses, we excluded error trials and trials with RTs faster than 300 ms or more than 3 SD above each participant’s mean, as described in our preregistration. Accordingly, we present descriptive statistics, then analyze for main effects interactions between condition type and performance (optimality, RT, accuracy, and switch rate). To do so, we compared performance between the first and second half of the study using two-way ANOVA analyses. We refer to these halves in the following sections as “epoch 1” (blocks 1 and 2) and “epoch 2” (blocks 3 and 4), which correspond to the blocks before and after the social comparison, respectively. Exploratory analyses not included in our preregistration are explicitly noted.
Descriptive Statistics

Search Optimality

Consistent with past ACVS data, participants displayed a range of differences in the proportion of optimal search choices made throughout the task. We found that optimality ranged from .21 (less than chance) to 1.00 (perfect optimality) between participants ($M = .64, SD = .21$). This signifies that participants actively used varying strategies during this task, with some searching less efficiently than others.

Response Time

Participants’ mean response time was 2717.59 ms (range: 1517.23 – 4603.42, $SD = 608.05$).

Accuracy

As in previous versions of the ACVS, mean accuracy was near ceiling ($M = 96.94\%$, $SD = .03$) with participants ranging from 86.85\% to 100\% accuracy.

Switch Rate

We measured frequency of switching by determining the proportion of trials participants switched target type from one trial to the next, such as from a red target to a blue target. In this experiment, the mean proportion of trials with target switching was .36 (range: .00 – .73, $SD = .14$). This range likewise shows that participants vary in how they search, with some never switching targets (i.e., only searching for one color for the entirety of the experiment).

Performance by Comparison Condition

To assess whether upward social comparisons improved strategy optimality during the second half of the ACVS, we performed a two-way ANOVA to analyze the effect of comparison type (upward, lateral, downward) and epoch (before and after the comparison) on optimality.
We found a significant main effect of epoch, likely reflecting a practice-related improvement, $F(1, 147) = 20.494$, $p = .001$, partial $\eta^2 = .122$, observed power = .994, but we found no significant main effect of social comparison condition, $F(2, 147) = .324$, $p = .723$, partial $\eta^2 = .004$, observed power = .101. Critically, we also did not find a significant interaction of epoch x condition $F(2, 147) = 1.552$, $p = .215$, partial $\eta^2 = .021$, observed power = .325.

We also found no evidence that the type of social comparison impacted other aspects of performance. Concerning response time, a two-way ANOVA analyses revealed a main effect of epoch, likely reflecting practice-related improvement as well, $F(1, 147) = 202.315$, $p = .001$, partial $\eta^2 = .579$, observed power = 1.000, though we found no significant main effect of condition, $F(2, 147) = .449$, $p = .639$, partial $\eta^2 = .006$, observed power = .122. Critically, we also did not find a significant interaction of epoch x condition $F(2, 147) = .882$, $p = .416$, partial $\eta^2 = .012$, observed power = .200.

Concerning accuracy, we found no significant main effect of epoch, $F(1, 147) = 2.373$, $p = .126$, partial $\eta^2 = .016$, observed power = .334, no significant main effect of condition, $F(2, 147) = .274$, $p = .689$, partial $\eta^2 = .005$, observed power = .109, and no significant interaction of epoch x condition, $F(2, 147) = .277$, $p = .759$, partial $\eta^2 = .004$, observed power = .093.

Analyzing switch rate, we likewise found no significant main effect of epoch $F(1, 147) = .075$, $p = .785$, partial $\eta^2 = .001$, observed power = .058, no significant main effect of condition, $F(2, 147) = .482$, $p = .619$, partial $\eta^2 = .007$, observed power = .128, and no significant interaction of epoch x condition, $F(2, 147) = .482$, $p = .653$, partial $\eta^2 = .006$, observed power = .119. Altogether, we found no significant interactions between the effects of condition and epoch on different metrics of ACVS performance, though participants did become faster and more optimal overall with practice.
Figure 2

Optimality, Accuracy, Reaction Time, and Switch Rate by Condition

Note. Each epoch refers to one half of the experiment, with epoch 1 representing before the comparison (blocks 1 and 2) and epoch 2 representing after the comparison (blocks 3 and 4). We found no significant interaction between the effects of condition and epoch on optimality, accuracy, RT, or switch rate.

Post-Experiment Survey Responses

We then analyzed responses to the first survey question presented at the end of the experiment: “Do you think the comparison made you try harder, about the same, or less than before?” To categorize these responses, we grouped them into four possible categories: harder, same, less, and other. Of our 150 participants, 114 responded to the question. Of those 114 responses, 66 reported the comparison made them try harder, 34 reported it made them try the same, zero said it made them try less, and 14 gave other, non-applicable answers (i.e., that
motivation changed because of something unrelated, such as mental exhaustion, or that they were aware of the manipulation). The frequencies of these responses are presented in Figure 3.

**Figure 3**

“*Comparison made me try…*”

![Graph showing response types](image)

*Note.* Thirty-six responses were not included in this chart, as they were left blank. Of the remaining 114 responses, no participants reported that the comparison made them try less than before. “Other” responses included comparison-irrelevant answers, such as participants indicating they tried less because the task itself was tiring, rather than because of the comparison.

We also checked whether any condition had a higher frequency of participants claiming the comparison made them try harder. However, responses were similarly distributed between conditions. Of those who reported that the comparison made them try harder, 26 were in the upward condition, 20 were in the lateral condition, and 20 were in the downward condition. Figure 4 shows the distribution of responses by social comparison condition. Although we did not include this test in our preregistration, an exploratory Chi-Square Goodness of Fit Test was used to determine whether the proportion of survey responses was equal between the three social comparison conditions. Since no participants reported the comparison made them try less, this
response type was omitted from analysis. We found the proportion of answers did not significantly differ by social comparison, $X^2(4, N = 114) = 3.428, p = .489$. Critically, the direction of the social comparison did not significantly impact how participants responded.

**Figure 4**

*Survey Response by Condition Crosstabulation*

<table>
<thead>
<tr>
<th>Condition</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>Total</th>
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<tr>
<td>&quot;Comparison made me try...&quot;</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Harder</td>
<td>26</td>
<td>20</td>
<td>20</td>
<td>66</td>
</tr>
<tr>
<td>Same</td>
<td>10</td>
<td>12</td>
<td>12</td>
<td>34</td>
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<tr>
<td>Less</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>5</td>
<td>2</td>
<td>7</td>
<td>14</td>
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<tr>
<td>Total</td>
<td>41</td>
<td>34</td>
<td>39</td>
<td>114</td>
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</table>

Interestingly, most participants who did respond reported the comparison made them try harder in the second half of the study (57.8%). Although this analysis was not included in our preregistration, we were curious as to whether subjective feelings about the comparison, rather than the comparison itself, modulated performance. Excluding those who gave non-applicable answers, we conducted exploratory two-way ANOVA analyses to see if any interactions between survey responses and performance existed. In other words, we wanted to explore whether those who reported that the comparison made them try harder actually improved over those who reported otherwise.

Concerning optimality, we found a significant main effect of epoch similar to what we found within subjects overall, $F(1, 111) = 9.450, p = .003$, partial $\eta^2 = .078$, observed power = .862, but no significant main effect of response type, $F(2, 111) = .244, p = .058$, partial $\eta^2 = .050$, observed power = .560. Critically, we also found no significant interaction of epoch x response type, $F(2, 111) = .178, p = .837$, partial $\eta^2 = .003$, observed power = .077.
Analyzing accuracy, we found no significant main effect of epoch, $F(1, 111) = 1.584$, $p = .211$, partial $\eta^2 = .014$, observed power = .239, no significant main effect of response type, $F(2, 111) = 1.494$, $p = .229$, partial $\eta^2 = .026$, observed power = .313, and no significant interaction of epoch x response type, $F(2, 111) = .758$, $p = .471$, partial $\eta^2 = .013$, observed power = .176.

Once again, we found that response time had a significant main effect of epoch, $F(1, 111) = 108.623$, $p = <.001$, partial $\eta^2 = .495$, observed power = 1.000, but no significant main effect of response type, $F(2, 111) = 1.785$, $p = .173$, partial $\eta^2 = .031$, observed power = .367. Once again, we found no significant interaction of epoch x response type, $F(2, 111) = .118$, $p = .889$, partial $\eta^2 = .002$, observed power = .068.

Finally, we found that switch rate had no significant main effect of epoch, $F(1, 111) = .250$, $p = .618$, partial $\eta^2 = .002$, observed power = .068, no significant main effect of response type, $F(2, 111) = .381$, $p = .684$, partial $\eta^2 = .007$, observed power = .110, and no significant interaction of epoch x response type, $F(2, 111) = .118$, $p = .889$, partial $\eta^2 = .002$, observed power = .068. Taken together, those who reported the comparison made them try harder did not significantly improve over those who reported otherwise.

**Discussion**

Why do some of us reliably use better strategies than others? What motivates individuals to improve their strategy use? These questions have been important in exploring what factors underly attentional control, or the ability to focus attention on what matters and ignore what doesn’t. In past research, social comparisons have been used to increase motivation to improve performance on different tasks. However, it was unclear whether this could translate to strategy use as well. Since cognition often takes place in the presence of others, rather than in isolation, exploring any interactions between social psychology and other cognitive areas like attention
may be useful in understanding what influences strategy use in real-world contexts. Although we originally hypothesized that social comparisons would increase use of the optimal strategy on the ACVS task, we found no evidence this is the case. Additionally, we found no evidence to support our prediction that upward social comparisons would be more impactful than downward comparisons during this task. Below, we discuss some possible explanations for our findings.

When evaluating what makes a social comparison effective in influencing behavior, many emphasize the importance of relevance and similarity when drawing comparisons. For one, Festinger’s initial social comparison theory (Festinger, 1954) hypothesized that comparisons are impactful only if they are deemed personally relevant. This has been extended to include the relevance of the comparison other, with those who share personal or relevant characteristics to the self being more relevant to self-assessment than those without similarity (Geothals & Darley, 1977). For example, comparing grades between classmates is more likely to be informative, and influential, than comparing grades between majors. This is because classmates share more relevant assessment-related standards than those in unrelated majors do. As a result, if comparisons are deemed irrelevant or too distant from the self, they may be discarded altogether (Mussweiler et al., 2000).

For this study, we originally planned to collect data in-person, though low subject turnout during the COVID-19 pandemic resulted in us recruiting online participants instead. When creating our comparisons, we initially hypothesized our in-person subjects would find the bogus peer data to be self-relevant. This is because our in-person participants are all recruited from the same introductory psychology course, so they would potentially know the bogus peers we were comparing them to (i.e., other people in their course) as a result. They would also share a larger affiliation to The Ohio State University as fellow undergraduate students and be closer in age
overall. Conversely, our online subjects had no connection nor affiliation to the bogus comparison others. It is possible the irrelevance and psychological distance of the comparisons contributed to our results, giving anonymity to participants and allowing them to be more disengaged than in-person participants may have been. Indeed, some research suggests online social comparisons may be less motivating than in-person comparisons (McLeod, 2011). Particularly, motivation may be higher when participants can identify those they are being compared to and lower when the process is entirely anonymous.

Concerning our online participants, their experience may have contributed to our results as well. We only recruited participants who had completed at least 50 experiments on Prolific, or those considered “highly experienced” participants. Although we did so to ensure we collected higher-quality data, this population may have been less naïve and less susceptible to manipulation than those with limited study experience. Overall, in-person subjects recruited from an introductory psychology course may have behaved differently than those online, both due to the relevance of the comparison and their relative naivety concerning psychological experiments.

Other than our method of data collection, the task we chose may have also contributed to our results. In past research, the ACVS has been used to study individual differences in search strategy and has been a useful tool in exploring variation in visual search task performance (Irons & Leber, 2018a). However, the variability of individual search strategies may make it difficult to determine whether any group differences do exist. Within our sample, participants ranged widely in how often they used the optimal strategy, with some optimal only 21% of the time and others optimal 100% of the time. Although we chose the ACVS because it is useful in measuring strategy use during visual search, the large differences in individuals’ baseline approaches make it difficult to detect whether an interaction might exist between social comparison and optimal
strategy use. In future work, exploring social comparisons using other paradigms may reveal whether the task we chose impacted our results.

Concerning our survey responses, we found that 38.9% of all participants reported the comparison made them try harder, while none reported it made them try less than before. However, despite more than a third of all participants reporting the comparison made them try harder, we found no differences in performance by response type. There are a few possible reasons for this. Firstly, demand characteristics may have contributed to these responses. Specifically, participants may have responded to this question based on how they thought we wanted them to respond. On the other hand, it is possible that participants did feel the comparison made them try harder, though this did not translate to their actual performance. Past research has shown individuals may label physiological arousal using explanations available to them (Schachter, 1964). In this way, participants may have assumed they tried harder because they had a reactive response to the comparisons, even if this was not the case. Alternatively, it is also possible participants did want to improve, but simply lacked insight into how to do so, as we do not inform them of the optimal strategy.

Although we found no interaction between social comparisons and search optimality, our online sample and the task we chose may have contributed to these findings. Accordingly, whether comparisons can impact strategy use is still to be determined, as past research has shown comparisons can increase motivation on different tasks, both real-world and experimental. Without time constraints moving forward, we plan to collect the rest of the in-person data we originally planned to collect. After completion, we aim to compare that data to our present findings. If there is a difference in strategy use between online and in-person data, this may lend insight into whether online social comparisons are less motivating for visual search tasks than in-
person comparisons. If there are no differences in optimal strategy use between online and in-person data, exploring other visual search tasks may be useful in determining whether our findings were unique to the ACVS.

Though strategies can make our lives more efficient, we are often suboptimal in how we use them. In the present study, we found no evidence social comparisons influence search optimality, though more research is necessary to explore whether our method contributed to these results. Moving forward, exploring this may reveal whether common social information can influence aspects of cognition, such as attentional control, in our daily lives.
References


