ORIGINAL RESEARCH

The Hierarchical Relationship Between the Relational-Self and the Collective-Self During Attention Processing

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Background: Under the Chinese collectivist cultural system, people emphasize social connections with close others and members of in-groups. Collectivism can be divided into the following two forms: relational collectivism (privileges relational self [RS]) and group collectivism (emphasizes collective self [CS]). Previous researchers have found a hierarchy between the RS and CS, resulting in different degrees of recognition advantages. However, the hierarchy between the RS and CS is unclear and may depend on the specific processing stage. Therefore, this research compared the hierarchy between these two selves during different processing stages using an eye-movement method.

Methods: The sample consisted of thirty-eight young adults aged between 18 and 24 years old (M = 20.45, SD= 1.62). Each participant finished a dot-probe task featuring high-relevant (HR, ie one's mother's name and China) and low-relevant (LR, ie, name of a famous person and USA) information about the RS and CS and neutral information. Further, the eye-movement (EM) indices were collected simultaneously.

Results: A stronger reaction time bias and longer total gaze duration revealed that young people in China focus more on RS information, indicating that Chinese people prioritize the RS over the CS at late stages of attentional processing.

Conclusion: Information on interpersonal relationships and information on the in-group both catch people's attention quickly and easily, but only RS information can maintain attention for longer. Understanding the hierarchy of the RS and the CS may provide more evidence for self-construal in the Chinese collectivist cultural context. The importance of the RS prompting that the interpersonal and close relationships are more important to the development of the self, suggesting that it is necessary to pay more attention to the impact of interpersonal support on people's mental health in clinical applications.

Keywords: relational self, collective self, attentional bias, hierarchical relationship, self-prioritization

Introduction

Under the Chinese collectivist cultural system, people emphasize social connections with close others and members of in-groups. Based on these two kinds of social connections, collectivism can be divided into the following two forms: relational collectivism and group collectivism.[1] Relational collectivism emphasizes interpersonal relationships with close others, that is, the relational self (RS). Group collectivism privileges depersonalized social relationships with one's in-group, that is, the collective self (CS).[2,3] Previous evidence has indicated that the RS and CS coexist in every individual, but humans show different hierarchies between RS and CS under a variety of context, as reflected in the differences in self-bias during different processing.[2–4] Self-bias affects most information processing during our daily lives, such as attention, cognition, memory, and motivation. However, the hierarchy of RS and CS during different processing has not yet been made clear in previous research. Under the collectivist cultural background, whether Chinese people emphasis

individual interpersonal relationship or network relationships within an in group is a problem that needs to be clarified. We aim to determine which kind of these two selves can attract people's attention more readily, which may provide evidence for the collectivist cultural tendency in China.

Researchers have investigated the hierarchy between RS and CS during a number of processing (eg memory, motivation, attitude), however there has not been consistent conclusions.[2–6] In former subjective assessment researches,[7–9] the participants were asked to compare the importance of three types of self (individual, relational, and collective). Researchers have found that people placed greater emphasis on RS than CS in both individualist and collectivist cultures. Researchers in Poland also found that young people diagnosed in 2018 were characterized by a greater preference for the family and its welfare than collectivist values.[10] In addition, younger inmates were even more likely to have relational self than individual self.[9] Mamat (2014) used participant's mother as a *RS* and one's career group as CS to measure the hierarchy between these two selves. The results found that *RS* was more important than CS for them. In contrast, other researchers used a close friend as RS and one's school class as CS to evaluate behavior and brain responses while participants were gambling. The results were inconsistent with former research, and the researchers found no differences in behavior or brain activity between RS and CS conditions, indicating that *RS* and CS did not differ in motivational process.[6]

Moreover, previous research investigating differences between RS and CS using the same stimuli but different processing types has also shown inconsistent results. Researchers selected one's mother as his or her RS and one's homeland as his or her CS. First, they used the typical implicit association test (IAT) to examine implicit attitudes about RS and CS among Chinese people.[2] The results showed that the participants reacted more quickly to consistent tasks (positive adjectives were paired with self-information, and negative adjectives were paired with non-self-information) related to CS than to tasks related to RS, indicating that Chinese people more easily associated the CS than the RS with positive valence. In another study, researchers examined neural representations of RS and CS during trait judgment tasks using functional magnetic resonance imaging (fMRI) at the explicit cognitive level. The participants were required to judge whether an adjective word was appropriate to describe RS or CS. The results showed that *RS* rather than CS generated stronger MPFC activity, indicating that people allocated more cognition resources to identifying and evaluating memories and emotional information when processing *RS* compared with CS.[3] These two studies showed that at the explicit cognitive level, Chinese people emphasize RS more than CS, but at the implicit cognitive level, people in China are more inclined to focus on CS. Based on these studies, we found that the hierarchy between RS and CS has shown inconsistent results in different tasks.

Researchers have suggested that the different hierarchies between RS and CS might be due to the specific processing type and stage. Wang et al, employed a variant of the priming paradigm to investigate the hierarchy of selves using event-related potentials (ERPs).[5] They found that CS activated greater P2 amplitudes than RS; however, RS activated greater P3 amplitudes than CS. These results showed that during the early (P2) stage, CS was more primary than RS, but during a late (P3) stage, *RS* became more primary than the CS. This result showed that the hierarchy of *RS* and CS depend on the specific processing stages. However, the priming paradigm used in Wang's research focused on the relationship between the representatives of the three selves. Different from previous research, Wang's research did not directly involve the processing of self-related information.

Stimuli that are emotionally significant receive enhanced processing and are prioritized in the competition for selective attention.[11] Preliminary findings supported the idea of the advantage of the RS and CS during attention processing.[12–14] The attention process is the first and foremost process by which we process information; without attention, people find it difficult to process information at a deeper level.[15,16] Attention is also a key process that researchers focus on when exploring the processing advantage of self-relevant information.[14] Thus, we want to examine whether the hierarchy between *RS* and CS depends on the specific stage for processing self-related information. Moreover, the eye-tracking technique can help us to investigate both early (eg attention alertness reflected by the initial orienting response to the stimulus) and later (eg shifts of attention reflected by the average time spent gazing at the stimulus) stages of attentional allocation. The early attention component represents the capture of attention, while the late attention component represents the maintenance of attention, indicating that it is difficult for people to transfer attention from the information, and represents more in-depth processing.[16] The dot-probe task is a typical task in the

field of attention research, it requires participants to judge the location of a probe after exposure to a stimulus (motivationally or emotionally salient stimuli). If the response times for probes that replaced particular stimuli were faster than those for probes that replaced neutral stimuli, then we can assume an attentional bias toward these particular stimuli. In addition, we used an eye-tracking technique to assess biases in specific components of visual attention processing (ie, orientation, detection, maintenance, and disengagement of gaze) in relation to RS and CS information. Thus, the present study seeks to examine the hierarchy of *RS* and CS during different attentional processing stages.

According to the above findings, during the late stage of processing or during deep processing, such as memory and decision making, the RS shows a higher processing advantage. Thus, we hypothesize that: 1) both RS and CS would show a greater bias during attention processing; and 2) RS would be prioritized over CS in attention processes, especially at the late attention stage, such as longer attention maintenance. This study may provide more evidence for the hierarchy of self-construal from cognitive processes under the Chinese collectivist cultural background.

Methods

Participants

Prior to data collection, we conducted a power analysis using a moderate effect size (eta-squared $\eta^2 = 0.25$) and the standard power (1-β = 0.95) to calculate the specific number of subjects with G*power (G*power3[17]). Assuming a within-factors repeated-measures F-test, the results showed that at least 36 participants were required.

The research sample included 21 women and 17 men at Southwest University of China (age: 18–24, $M = 20.45$, $SD = 1.62$) who were unmarried, were raised by their parents (the mother was the primary caregiver), and predominantly belonged to the Han majority ethnicity (97.5%). The participants were all right-handed and had normal or corrected-to-normal vision. After the experiment, each participant was paid 15 Yuan. The research was conducted according to the ethical standards of the institutional and national research committee and the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. All participants provided informed consent. The Ethics Committee of the Southwest University of China approved this study. Participants were recruited through the campus electronic bulletin board system.

Apparatus

A 19-inch, 85-Hz monitor connected to a Pentium IV 3.2-GHz computer was used to present stimuli. An EyeLink II tracker (SR Research, Mississauga, Ontario, Canada) connected to a Pentium IV 2.8-GHz host computer was used to record eye movement (EM) data. The sampling rate of the eye tracker was 250 Hz, with a 0.01° resolution in pupil-tracking mode, and the spatial accuracy was greater than 0.5°. Head motion was tracked by an infrared head motion system and minimized by a forehead and chin rest (which was also used to maintain the viewing distance). The distance between the participants and the monitor screen was 70 cm, and the visual field for each participant was 29° horizontal and 22° vertical. Before the task, a 9-dot calibration procedure was carried out for standard calibration for EMs. EM data were recorded during each trial starting immediately before the onset of a word pair and terminating immediately after word pair offsets.

Stimulus Words

Relational self: As the most important and closest person to oneself, participants' mothers have been used to represent the *RS* in numerous experiments.[7,18,19] Thus, we used the participants' mothers' names (familiarity degree: 6.73) as the high-relevant (HR) material for the *RS* and the name of a famous female person (familiarity degree: 5.95) that matched each mother's name in the total number of Chinese characters as the low-relevant (LR) material for the RS. Before the experiment, every participant evaluated the familiarity (1–7 points) of 50 common Chinese names, and 30 of the common names (familiarity degree: 4.86–5.14) were selected for each participant as neutral stimuli to match the HR and LR stimuli. For each participant, all stimuli were matched for character length and stroke number (measured by the total number of Chinese characters) by pre-experimental screening of volunteers and names.

Collective self: Chinese participants generally feel a strong connection with their own country;[5,20] therefore, we selected "China (shown as 中国 in Chinese)" (familiarity degree: 6.55) as the HR material for the CS to avoid the possibility that the participants would disagree with the CS.[20–23] In addition, "USA (shown as 美国 in Chinese)" (familiarity degree: 5.91) is a relatively familiar foreign country to Chinese people that could serve as a control group of comparable size and nature.[20] Therefore, "USA" was selected as the LR material for the CS. In addition, thirty common country names (familiarity degree: 4.68–5.18) including two Chinese characters (eg, Japan, Korea) were used as neutral stimuli during the CS blocks.

In addition, another 12 household supply word pairs were selected for use during practice trials (eg, "table-stove"). The words in each pair were matched for frequency of occurrence and word length. The word pairs measured 60 mm × 90 mm, and the centers between them were 10 cm apart. During statistical analysis, the position of each stimulus was defined as the area of interest (AOI), and the length and width of the AOI exceeded 33% and 50% of the stimulus picture, respectively.

The Dot-Probe Task

During the dot-probe task, each trial started with a fixation cross shown in the center of the screen that continued for 1000 ms. Then, a word pair replaced this cross and disappeared after 1500 ms.[24] Immediately after the word pair vanished, a one-dot probe was presented in the location of one of the word pairs, and the participants were required to indicate the location of the dot by pressing a key (left press the "F" key, and right press the "J" key) as quickly and accurately as possible. The probe stayed on the screen until the participant submitted a response or five seconds had passed. The interval between each trial randomly varied from 750 to 1250 ms (see Figure 1).

After 12 practice trials, each participant completed 288 experimental trials falling into four blocks of 72 trials each. Two of these four blocks consisted of *RS* information, and the other two blocks consisted of CS information, with half of the participants performing the *RS* task first, while the other half performed the CS task first. All blocks included 24 trials each of HR-neutral, LR-neutral, and neutral-neutral word pairs (to vary the task and reduce monotony). The positions of the probe and the HR/LR information were balanced across trials. The sequences of all kinds of stimuli were randomized.

Results

Data Preparation

Preparation of the Reaction Time Data

Reaction times (RTs) less than 200 ms or more than 2000 ms or trials with errors were eliminated from follow-up analyses.[25–27] The formula [(WLDR-WRDR)+(WRDL-WRDL)]/2 (W = HR/LR stimuli, D = dot-probe, L = left position, R = right position) was used to initially calculate the attentional bias in the RT scores. Positive values indicated vigilance (ie, a faster reaction to probes followed by HR stimuli than to probes followed by neutral stimuli). Negative denoted avoidance (ie, a slower reaction to probes followed by HR stimuli than to probes followed by neutral stimuli).

Preparation of the Eye-movement Data

Fixations to a position were defined as saccades that remained stable within a 1° visual angle for at least 100 ms, and the durations of these fixations were recorded. Fixations on either word were identified when the following 3 conditions were satisfied: (1) before word onset, the participants fixated on the central region of the screen; (2) saccades occurred at least
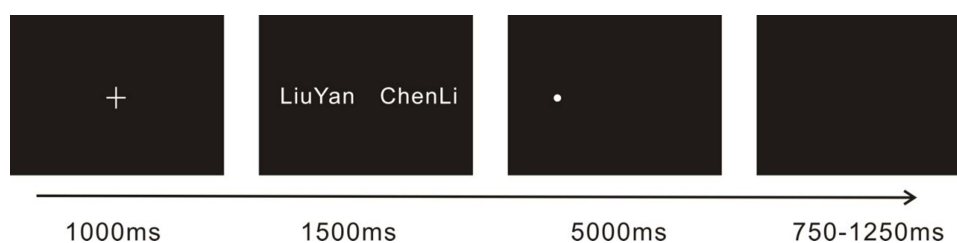

Figure 1 Illustration of the stimuli and procedures of the dot-probe task used in the experiment.

100 ms after word onset and before word offset; and (3) during the presentation of word pairs, the participants fixated on the space of either word. In the present experiment, initial fixations were noted on the word pairs in 91.11% of all trials. One-way ANOVA on the remainder of the trials (see Table 1) revealed that the data loss did not differ between conditions, $F(3148) = 1.08$, $p = 0.359$. The EM indices for orientation biases included EM direction bias, the first fixation latency, the first fixation duration bias, and gaze duration bias scores, as in previous EM studies.[26]

Main Analyses

Biases in RT

Descriptive statistics for the RT data and RT biases for each information type are shown in Table 2. A 2 (information type: RS vs CS) ×2 (relevance: high vs low) repeated-measures ANOVA on the RT bias revealed a main effect for information type, $F(1,37) = 5.09$, $p = 0.03$, $\eta^2 = 0.12$, with an *observed power* = 0.59. Post hoc tests showed that the RT bias in *RS* conditions was greater than that in CS conditions. Moreover, a significant main effect was observed for relevance, $F(1,37) = 4.78$, $p = 0.035$, $\eta^2 = 0.11$, with an *observed power* = 0.57, indicating that the participants showed significantly faster mean RTs in response to probes that followed HR information than those to probes that followed LR

Table 1 Summary of the Eye-Movement Data for the HR and LR Information Under the Relational Self and Collective Self Conditions

Variable	Self Type	Relational Self		Collective Self	
		M	*SD*	*M*	*SD*
Direction of initial gaze bias (%)	HR	52.61	9.68	51.37	12.05
	LR	48.11	11.99	45.61	11.68
First fixation latency bias (ms)	HR	−8.71	137.95	12.51	129.89
	LR	42.24	122.65	22.91	143.52
First fixation duration bias (ms)	HR	46.93	99.32	26.65	201.79
	LR	−6.58	94.66	−22.11	156.01
Gaze duration bias (%)	HR	55.58	7.66	50.26	9.37
	LR	51.82	6.65	50.82	10.22
Remainder trials (%)	HR	92.02	6.01	93.31	9.17
	LR	89.23	6.01	89.44	10.92

Table 2 RT Data and RT Bias Scores for Specific Information Types Under the Relational and Collective Self Conditions

Location		Relational Self (n = 38)		Collective Self (n = 38)	
Words	**Dot Probe**	*M*	*SD*	*M*	*SD*
HR					
Left	Right	471.86	89.40	470.46	102.42
Left	Left	449.36	76.18	462.41	90.83
Right	Left	479.03	102.80	468.91	85.47
Right	Right	458.31	77.14	457.30	82.35
RT-bias		21.56	37.66	9.72	29.89
LR					
Left	Right	466.52	74.68	466.43	73.90
Left	Left	462.86	63.91	469.51	91.15
Right	Left	481.76	90.10	471.15	94.83
Right	Right	474.44	91.17	472.04	96.39
RT-bias		5.17	36.07	−1.85	29.83

information. However, the information type× relevance interaction did not reach significance, $F(1,37) = 0.25$, $p = 0.25$. Furthermore, we conducted a paired t-test to compare the RT bias between the RS and CS information periods, and the results showed that the RT bias of HR information about the RS was greater than that of the CS, $t(37) = 2.23$, $p = 0.03$ (Figure 2).

Direction of the Initial Gaze Bias

A 2 (information type: RS vs CS) ×2 (relevance: high vs low) repeated-measures ANOVA of the direction of the initial gaze bias showed a significant main effect of relevance, $F(1,37) = 10.57$, $p = 0.002$, $\eta^2 = 0.22$, with an *observed power =* 0.89. Post hoc tests revealed that the participants had more initial fixations toward HR than toward LR. The main effect of information type and the information type× relevance interaction did not reach significance, $F(1,37) = 1.41$, $p = 0.24$ and $F(1,37) = 0.33$, $p = 0.57$, respectively (Figure 3).
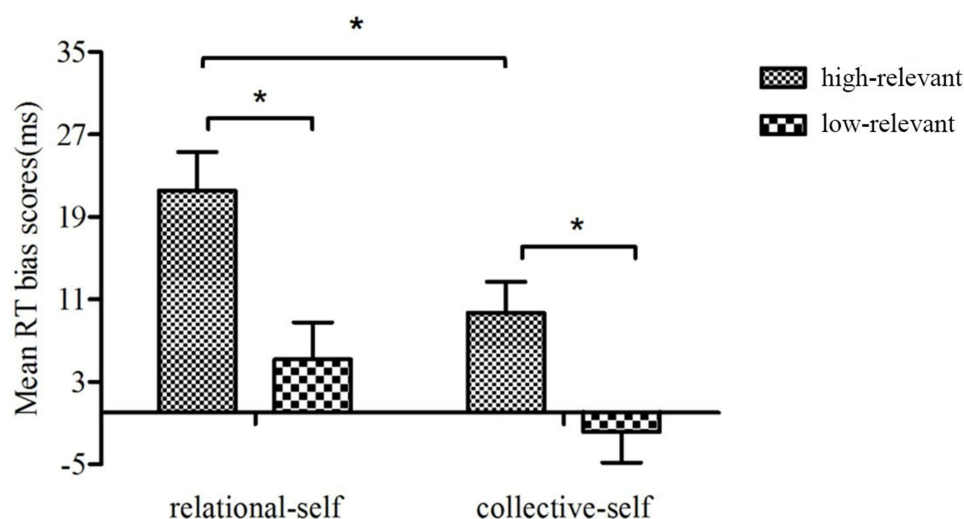
Figure 2 The mean RT bias scores for HR and LR information under the relational and collective self conditions.
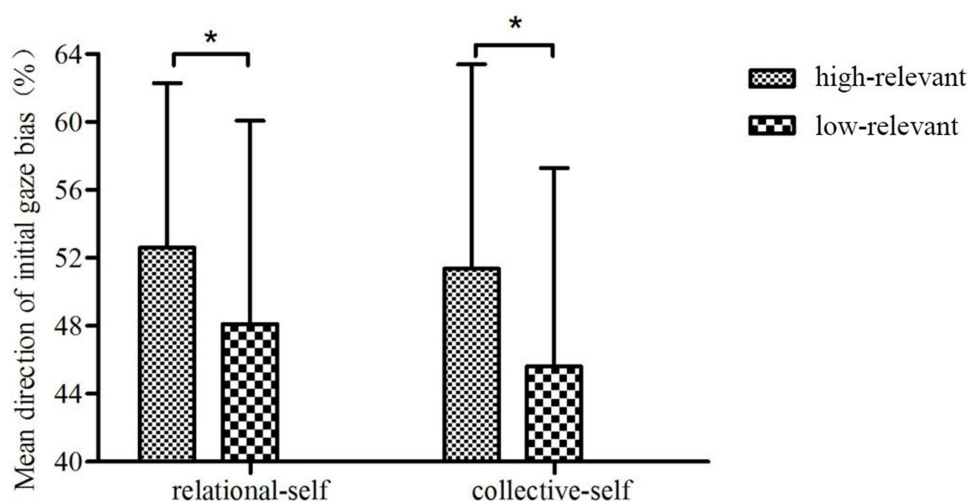**Note**: *$p < 0.05$.

Figure 3 The mean direction of the initial gaze bias scores for the HR and LR information under the relational and collective self conditions.
Note: *$p < 0.05$.

First Fixation Latency Bias

A 2×2 repeated-measures ANOVA on the first fixation latency bias showed no significant differences for information type ($F(1,37) = 0.005$, $p = 0.943$) or relevance ($F(1,37) = 1.59$, $p = 0.22$). In addition, the information type × relevance interaction was not significant, $F(1,37) = 1.50$, $p = 0.23$. No significant differences in the first fixation latency bias were found between the HR and LR information under the RS and CS conditions.

First Fixation Duration Bias

The first fixation duration bias was analyzed using a 2×2 repeated-measures ANOVA. The main effect of relevance reached significance, $F(1,37) = 4.35$, $p = 0.04$, $\eta^2 = 0.11$, with an *observed power* = 0.53, indicating that the participants first looked at HR information more than they looked at LR information. However, no significant differences in first fixation duration bias scores emerged for information type, $F(1,37) = 0.47$, $p = 0.49$, or the information type× relevance interaction, $F(1,37) = 0.03$, $p = 0.86$ (Figure 4).

Gaze Duration Bias

The gaze duration bias was analyzed using a 2×2 repeated-measures ANOVA. The main effect for relevance was marginally significant, $F(1,37) = 3.45$, $p = 0.07$, $\eta^2 = 0.09$, with an *observed power* = 0.44. A significant main effect was noted for information type, $F(1,37) = 4.61$, $p = 0.04$, $\eta^2 = 0.11$, with an *observed power* = 0.55, and a significant information type × relevance interaction was observed, $F(1,37) = 7.73$, $p = 0.008$, $\eta^2 = 0.17$, with an *observed power* = 0.77 (Figure 5). The simple effects analysis (corrected by LSD) indicated that the overall gaze duration for the HR information was longer than that for the LR information under the RS condition ($t = 3.76$, $p = 0.002$), but no significant difference between HR and LR information was found under the CS condition ($p = 0.64$). Moreover, the participants showed longer overall gaze durations for HR information under the RS condition than for HR information under the CS condition, $t = 5.32$, $p = 0.006$.

Discussion

The present experiment explored the hierarchy between RS and CS information in attentional bias. Consistent with our hypothesis, the results demonstrated that 1) both RS and CS showed self-bias during attention processing; and 2) there was a stronger attentional bias for the *RS* than for the CS, especially at the late processing stage. EM tracking revealed that the participants showed longer total gaze durations for HR information in RS conditions than in CS conditions, indicating that the RS has a higher position in the hierarchy than CS at the late processing stage. Information on interpersonal relationships and in-groups both catch people's attention quickly and easily, but only the RS can maintain
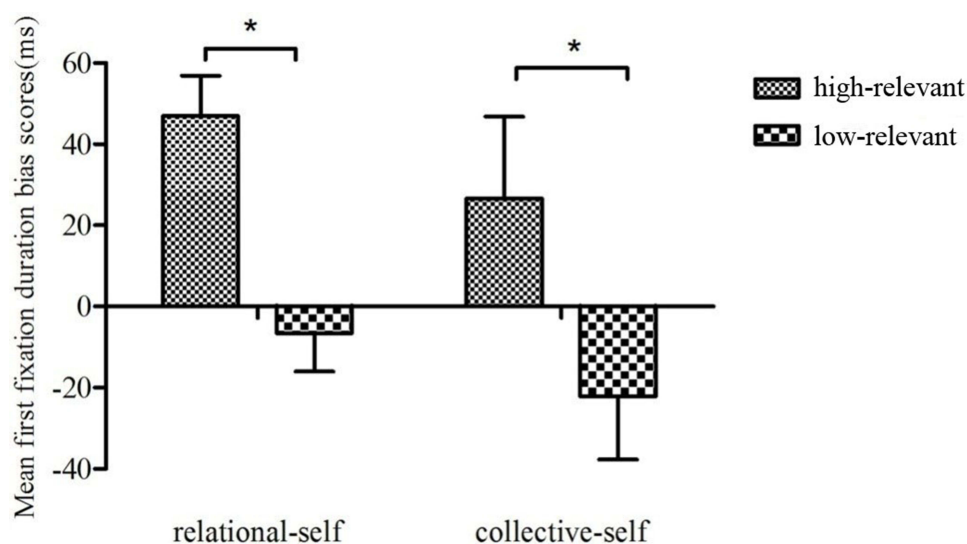

Figure 4 The mean first fixation duration bias scores for the HR and LR information under the relational and collective self conditions.
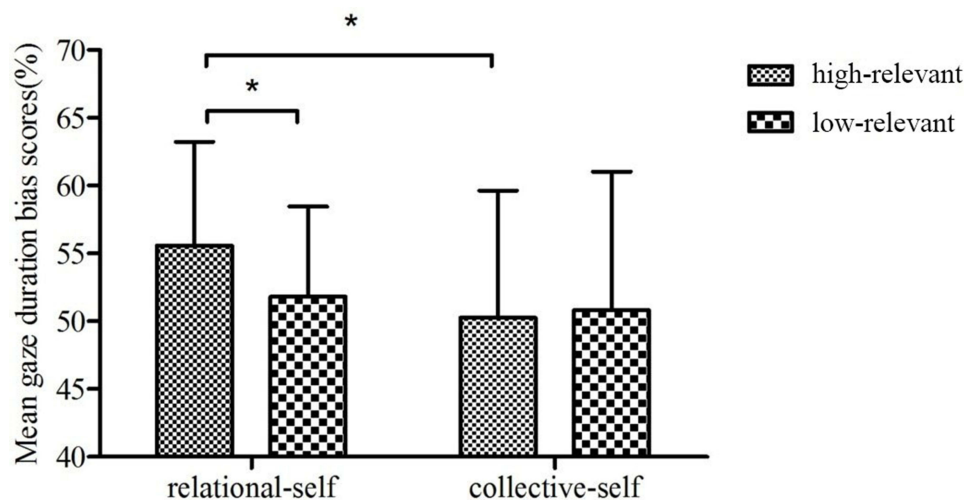**Note**: *p < 0.05.

Figure 5 The mean gaze duration bias scores for HR and LR information in the relational and collective self conditions.
Note: *p < 0.05.

attention for longer. In addition, the EM data indicated that the Chinese participants showed a vigilance-maintenance pattern toward HR information, not LR information, under both the RS and CS conditions.

Our findings showed a hierarchy between the RS and CS, and this hierarchy only occurred at the late stage of processing, such as attention maintenance. The RT bias difference indicated stronger attentional maintenance for RS than CS information. Accordingly, the EM indices, such as the gaze duration, also showed attentional maintenance for HR information on the *RS* over HR information on the CS. The overall attention late-stage maintenance advantage indicated that attention to one's RS was maintained longer than attention to one's CS and that diversion after the early visual attention captured by this type of stimulus was more difficult to achieve. Consistent with this result, Zheng et al[3] found that RS generated stronger MPFC activity than CS, indicating that RS processing involves more cognitive resources. The RS, as a representation of interpersonal relationships with close others, is more individualized and personally specific than the CS. Therefore, the RS has higher emotional significance for people.[1] When processing RS information, people use more attentional resources to evaluate emotional and memory information related to close others. Therefore, visual attention was maintained for *RS* information and was more difficult to distract with other information.

In the present study, the stronger RT bias and longer overall gaze duration for HR information on the *RS* than for HR information on the CS suggest that the RS has a higher priority at the late stage of attention processing. Consistently, a previous ERP study indicated that in the late (P3) stage, the RS became more primary than the CS.[5] However, in an early stage of cognitive processing, for example, during initial orientation and initial maintenance, no difference was found between these two selves. This result indicates that during early attention processing, the RS and CS can both equally capture people's attention. However, at the late stage, such as during attention maintenance and attention transference, the RS caused more difficulty disengaging attention, and people looked at the RS stimulus words longer than the CS stimulus words.

Nehrlich et al[4] proposed the use of different self-roles to explain the hierarchy of self-construal and found that the CS was less functional in fulfilling one's teleological ideal than the RS. This finding can explain why the attentional bias for the RS was stronger than that for the CS. Early studies also suggested that attention processing can be modulated and guided by emotional salience.[28] However, studies have recently used an implicit measure of positive valence associated with an in-group and found no correlation between in-group performance and an implicit association score in a perceptual matching task.[12] Accordingly, the in-group at a perceptual level is not based on emotional significance. A study of self-advantage reached a similar conclusion such that the two advantage effects of matching for stimuli associated with self and matching for positive emotion-related stimuli and valence were not correlated.[29] Consistent with

our previous research, Chinese people are more likely to implicitly associate the CS with positive valence implicitly rather than the RS.[2] This contrasting result reflects the same conclusion that a stronger RS advantage effect in visual attention does not stem from associated positive valence but may instead be driven by the unique processes involved in self-representation.

Moreover, we assessed the bias in specific components of visual attention processes (ie, orientation, detection, maintenance and disengagement of gaze) toward RS and CS. Our results demonstrated that people have an attentional bias for the RS. People may have had more difficulty disengaging from *RS* stimuli when their attention was captured by these stimuli. Previous researchers have found that even with blurred vision, unclear pictures or changes in viewing perspectives, people can still recognize the faces of important others.[30] Wang et al[31] asked participants to recognize their own faces and their parents' faces during an oddball task, and the RT data showed that recognition of parents' faces was significantly faster than that of strangers' faces, confirming the perceptual advantage of the RS. Research at a neuronal level yielded similar results. Arsalidou et al[32] found that mothers' faces activated a nonvisual expansion system including brain areas such as the inferior frontal gyrus and the middle temporal gyrus that was not activated by strangers' or celebrities' faces. Brain regions involved in semantic and contextual memories and emotional processing were activated when individuals identified RS information, indicating that a high emotional and reward value[33] led to directional biases and an initial orientation toward RS. Previous evidence indicates that people focus more on HR information than LR information related to the RS, and our results further showed that the attentional advantage of the RS is mainly reflected during both the early and late attention stages.

Our results revealed that people searched CS information more quickly and looked at this information longer than other information. Researchers found an in-group advantage by asking football fans to complete a perceptual matching task. The results showed that RTs to stimuli related to the participants' own football teams were faster than those to stimuli related to rival or neutral teams.[12,34] The CS priority also occurs in the well-known collective-self reference effect, which is found in both West and East Asian cultural backgrounds,[20,35] indicating that information processed in reference to the CS can be better remembered. Consistently, Moradi et al[36,37] found that attending to stimuli associated with an in-group was difficult to resist, indicating that people had an attention maintenance bias for the CS. Researchers used the national flag of one's motherland as an indicator of the CS and found that this CS symbol activated a greater P300 amplitude (involved in emotional processing) and longer N1 latency (associated with early visual attention) than another country's flag.[38] The results based on these electrophysiological indicators are consistent with our RT and EM results, showing that the attention advantages of the CS are mainly reflected in both the initial orientation and initial maintenance biases.

Theoretical implication: To the best of our knowledge, this study is the first to use an eye-tracking technique to compare the hierarchy in attentional bias between the RS and CS. A stronger RT bias and longer total gaze duration showed a greater RS priority than a CS priority at the late stage of cognition processes, indicating that people stay focused on the *RS* longer. Thus, with rapid social and economic development, Chinese people may prefer personal social relationships over traditional group collectivism. Determining the difference in attention bias between the RS and CS could help us understand the hierarchy of triple self-construal from low-level cognitive processes, especially under the Chinese collectivist cultural background. Practical implication: The interaction of "person in context" variables produces distinctive patterns of people's personality and behavior,[39] and understanding the hierarchy of RS and CS during attention processing could help people to choose the right self to better adapt to the changing environment. The importance of RS began in the attentional processing stage, providing recommendations for the more effective delivery of information in social media and advertising industries. It also suggests that interpersonal and close relationships could have a great influence on mental health. Therefore, it is necessary to promote active support from family members, friends, and social relations to maintain people's mental health.

One limitation of the present study is that we used only the participants' mothers' names as the HR information for the RS condition and "China" as the HR information for the CS condition. Moreover, throughout life, people belong to many groups, such as those based on ethnicity, class, community, and company. The attentional bias differences between the RS and CS may have been altered if we used different information. Although we counterbalanced the familiarity of neutral stimuli, the participants may have had different feelings toward these neutral stimuli, which may have affected their responses. In follow-up research, we should consider balancing subjects' feelings toward neutral stimuli and select specific neutral conditions for each subject. Furthermore, our sample consisted solely of Chinese participants. Future research should explore whether culture plays a modulatory role in the attention advantage of the RS and CS. In addition,

researchers in Poland found that young people diagnosed in 2018 were characterized by a greater preference for the family and its welfare compared with young people diagnosed in 2003, indicating that people's self-hierarchy was influenced by the changes in the political and economic conditions of society.[10] Participants of different ages should be included in future studies. We also did not include information related to the individual self for comparison. In future studies, the hierarchical relationship of tripartite self-construal can be judged more clearly with this comparison.

Conclusions

The present research aimed to compare the hierarchy between relational self and collective self during different attentional processing stages using an eye-movement technique. A stronger RT bias and longer total gaze duration showed a greater RS priority than CS priority at the late stage of cognition processes, indicating that people remain focused on the RS longer. Information about interpersonal relationships and information about the in-group both catch people's attention quickly and easily, but only RS information can maintain attention for longer. These results highlight the important of relational self.

In this sense, interpersonal relations are more important to the development of the self, and it is necessary to pay more attention to the impact of interpersonal support on people's mental health in clinical applications. The present study also expands the self-construal theory in the context of Chinese collectivist cultural. Future research should further refine the types of relationships and in-groups and added multicultural factors.

Institutional Review Board Statement

The study was conducted according to the guidelines of the Declaration of Helsinki, and was approved by the Institutional Review Board of Southwest University (protocol code H18070 and 2018.10).

Informed Consent Statement

Informed consent was obtained from all of the subjects involved in the study.

Funding

Disclosure

The authors declare no conflicts of interest for this work.

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