# An implicit and explicit assessment of morphic resonance theory using Chinese characters

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# AN IMPLICIT AND EXPLICIT ASSESSMENT OF MORPHIC RESONANCE THEORY USING CHINESE CHARACTERS

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## *ABSTRACT*

Learning and memory have traditionally been assumed to be solely reliant on cortical functioning. However, the transmission of acquired habits and transgenerational memory effects challenge this assumption. A complementary view is that learning and memory may also be supported by some form of interaction, or resonance, that takes place between the individual and a wider morphic field which contains information that may be able to shape learning and memory. It has been suggested that information from such a morphic field could influence an individual's ability to respond to an unfamiliar language which has a large number of past speakers. This has been tested using non-Chinese speaking individuals presented with real and decoy Chinese characters. However, the outcomes have been equivocal. Hence, the aim of the current study was to examine and extend this research by utilising and comparing performance from implicit and explicit tasks. The predictions were that participants should implicitly prefer real Chinese characters and explicitly identify real Chinese characters at levels greater than chance. An opportunity sample of 154 participants completed an implicit preference task and an explicit identification task online with task order counterbalanced. In each task participants were shown, in a random order, 12 pairs of characters (one real and one decoy). In the implicit task they were required to identify which of the characters they preferred and in the explicit task they were asked to identify which of the pair was the real character. Measures of belief in psi were also obtained. The results showed that, contrary to the prediction, participants significantly preferred the decoy Chinese characters. There was no difference in explicit identification rates and no correlations between performance and belief in psi. These findings fail to support the idea of morphic resonance and are more parsimoniously accounted for in terms of an aesthetic preference for the decoy characters.

## INTRODUCTION

The accepted view of learning and memory is that such processes rely on and are supported by changes in the brain of the individual or organism (e.g., Kolb, Whishaw, & Teskey, 2016; Pinel & Barnes, 2014). For instance, changes in the strength and number of connections at the synapse (Muller, Nikonenko, Jourdain, & Alberi, 2002) as well as structural changes to the dendritic spines of neurons (Kasai, Fukuda, Watanabe, Hayashi-Takagi, & Noguchi, 2010) are argued to underpin the essential processes of learning and memory. However, some of the findings from the literature on learning and memory seem at odds with the view that learning is solely reliant on the formation of memory representations in the brain alone. For example, early research has shown that animals are able to demonstrate the hereditary transmission of acquired habits. That is, subsequent generations can learn more quickly what previous generations took longer to acquire (McDougall, 1938). This pattern of behaviour has been replicated by others (Agar, Drummond, Tiegs, & Gunson, 1954). More recently, research has suggested that new learnt information may be inherited biologically, something that has been referred to as transgenerational memory effects (Grossniklaus, Kelly, Ferguson-Smith, Pembrey, & Lindquist, 2013). For instance, Dias and Ressler (2014) found that having mice learn a new conditioned fear response to a specific odour led to similar conditioned fear responses in their offspring despite the offspring never having been exposed to the original odour, suggesting that experiences are somehow transferred across generations. Importantly, such transgenerational memory effects have also been suggested to occur in humans (Matthews & Phillips, 2010).For a recent review see Horsthemke (2018).

Such effects may represent a challenge to the notion that learning and memory rely only on prevailing neurological changes which naturally form in response to modifications of current behaviour. Nevertheless, a plausible complementary view is that learning and memory may be influenced not only by the formation of memory representations in the brain but also by some form of interaction between the individual or organism and an intra-species record of information which may be used to guide and shape learning and behaviour. This view is encapsulated within the framework of morphic fields proposed by Sheldrake (2011). According to Sheldrake (2011) a morphic field of information operates beyond space and time but is nevertheless able to interact with an individual in space and time through a process referred to as morphic resonance. The morphic field is assumed to contain information regarding previous events or experiences relating to a particular organism or species and is thought to be able to influence similar organisms or species in the future, acting as a species-specific field of memory. A central assumption of this idea is that an individual or organism can access the field and acquire information from the morphic field of its species as well as contributing information to it. Thus, there is thought to be a two-way interaction between an individual organism and its wider morphic field. Sheldrake (2011) refers to this influence of past individuals or organisms on present behaviour as the principle of formative causation. Via the process of morphic resonance, an individual in the present is supposed to be able to draw upon and be influenced by information gained by similar individuals in the past, such that the more individuals of a particular species that have contributed to a morphic field the greater the level of influence there is likely to be. Hence, if animals learn a new skill in a specific setting then later animals from the same species should in theory be able to learn the same new skill more quickly and/or more accurately as they should be able to draw upon information from the morphic field. In this way the idea of morphic fields and morphic resonance may offer an alternative interpretation for the transgenerational memory effects seen in some animals as outlined above. Animal research studies directly testing this claim have reported some evidence for formative causation; for example, in reporting evidence of the conditioned aversion of chicks to peck a stimulus only their parents were exposed to (Sheldrake, 1992a)[1].

When applied to human beings, the theory predicts that people should be able to learn more easily material that has already been learned by others and this may be influenced by the number of previous learners. That is, it should become easier to learn something that more and more people have already learned. An early test of this was conducted by Sheldrake (1983) using two pictures containing hidden images. According to Sheldrake (1983), it should be easier for people to identify one of the hidden images once many others had seen it. This was achieved by presenting one of the images on television to approximately 2 million people in the UK. Subsequently Sheldrake found that the broadcast figure was more readily identified than a control figure when presented to individuals in countries outside of the UK (who presumably were not exposed to the broadcast). A similar pattern was reported by Mahlberg (1987), who compared the learning of Morse Code, which is well known by many, to an equally difficult “Novel Code” and found that participants unfamiliar with either code learned Morse Code more quickly than the Novel Code. Interestingly, consistent with the suggestions of Sheldrake, Mahlberg (1987) also found that learning of the “Novel Code” became easier over time, as more people had become familiar with it. More recently attempts have been made to test morphic resonance theory when learning foreign language characters. This can be especially useful when there is a large population associated with the use of such language characters both in the present and from the past as Sheldrake (2011) has suggested

[1] It should be noted that Rose (1992) disagreed with the interpretation of this data as supporting the notion of formative causation, though Sheldrake (1992b) has robustly defended that interpretation.

that such widespread knowledge of the language should produce a deeply entrenched morphic field that in turn would be expected to positively influence any subsequent learning behaviour. With this in mind, Robbins and Roe (2010) presented participants with a selection of genuine and decoy Mandarin Chinese characters with the rationale that participants should find it easier to learn and remember the real characters because there would be a stronger morphic field associated with them. Indeed, they found that participants accurately recognised significantly more of the real Chinese characters, thereby supporting the theory of morphic resonance. However, a follow-up study by Roe and Hitchman (2011),using a larger stimulus set which more rigorously matched the real and decoy characters across a range of features, including complexity and number of strokes, failed to show any clear advantage for real characters compared to the decoys in a recognition task.

One possible reason for these disparate findings may be that the tests used to elicit such effects were predominantly reliant on explicit memory processes (see e.g., Roediger, Buckner, & McDermott, 1999). An explicit task generally requires the conscious recollection of material from a previous episode and as such invokes a greater level of conscious cognition and control which in turn may slow the thinking, allowing more time for unhelpful conscious cognitive processes to interfere and/or inhibit any resonance effects. In contrast, an implicit task need not make any reference to prior learning episodes and can be completed without the need for conscious cognitive processes. A point made evident by the many reported dissociations between explicit and implicit task performance (Toth, 2000). This is evident in assessments of the mere exposure effect, which refers to the finding that individuals rate a stimulus more positively after being repeatedly exposed to it. For instance, comparisons of multiple explicit and implicit measures of responses to both supraliminal and subliminal stimuli have shown that implicit measures were more sensitive than explicit ones (Kawakami & Yoshida, 2019). Indeed, Bargh and Ferguson (2000) have suggested that anomalous effects, such as morphic resonance, may be better understood and explored using implicit compared to explicit tasks. Such a proposal is consistent with the findings from a recent meta-analysis on precognition which showed more robust effects when examined using implicit tests (Bem, Tressoldi, Rabeyron, & Duggan, 2015).Hence, in an effort to try and tease apart the possible influences of these processes the current study examined people's ability to identify Chinese characters using both an implicit preference task and an explicit identification task. In addition, possible links between performance and belief in anomalous phenomena was also examined.

Based on the theory of formative causation the expectation was that people should implicitly prefer *real* Chinese characters to *decoy* characters at a level greater than chance (since they had been acquired by generations of previous Chinese language learners), and that they should be able to explicitly identify *real* Chinese characters presented alongside decoy characters more accurately than chance. Finally, based on the findings of Bem et al. (2015), which suggest that explicit conscious cognitive processes may interfere and/or inhibit anomalous effects, we predicted that the effect of morphic resonance should be greater for the implicit preference task compared to the explicit identification task.

*Confirmatory hypothesis for the implicit preference task*

1. Participants will implicitly prefer (i.e., select) real Chinese characters to decoy characters at a level significantly greater than chance (i.e., 50%).

*Confirmatory hypotheses for the explicit identification task*

2. Participants will explicitly identify real Chinese characters presented alongside decoy characters at a level significantly higher than chance (i.e., 50%).

*Exploratory hypotheses*

1. The effect size for the implicit preference task will be greater than that of explicit identification task

2a. Participants performance on the implicit preference task may positively correlate with their belief in psi

2b. Participants performance on the explicit identification task may positively correlate with their belief in psi

## METHOD

### *Ethics*

Full ethical approval was granted to the project from the Canterbury Christ Church University Faculty Ethics Committee (Ref: 17/SAS/38C) ensuring compliance with the ethical guidance provided by the British Psychology Society (BPS) Code of Human Research Ethics (2014).

### *Pre-registration and open access*

This study was pre-registered at the Koestler Parapsychology Unit (Ref#1046:http://www.koestler-parapsychology.psy.ed.ac.uk/Documents/KPU_Registry_1046.pdf) and a copy of the raw data has been uploaded to the site.

### *Apriori power analysis*

The effect size reported by Robbins and Roe (2010) was 0.41. However, this represents an estimation and as such it may exaggerate the potential effect size. Hence, we will adopt a slightly more conservative approach and utilise an effect size of 0.3, which Cohen (1988) identified as small (i.e., from 0.1 – 0.3), to ensure adequate power in the current study. Adopting the standard alpha criterion of 0.05 (two-tailed), coupled with a test that has the statistical power of 0.95, the required sample size can be calculated using Howell's (1992) sample calculation where power of 0.95 as a function of significance at 0.05 (two-tailed) translates into a $\delta$ score of 3.60 (Appendix Power Tables from Howell, 1992). This recommends a minimum sample size of $3.60/0.3^2$ which equals 144, rounded up to ensure an even number of participants viewing each of the list configurations means that we will aim to recruit and test an opportunity sample of 160 participants.

### *Participants*

Initially 176 participants took part in the task, of whom 14 were excluded for responding positively to the Chinese screening questions (see Appendix A) and a further eight were excluded for not fully attending to the task. This left 154 participants, comprising 106 (68.8%) females, 47 (30.5%) males and 1 (0.6%) who preferred not to answer a question related to gender. Participants' ages ranged from 18 – 76 years with a mean of 33.5 years. In terms of ethnicity, 99 (64.3%) participants classified themselves as "White British", with 3 (1.9%) "Black British", 3 (1.9%) "Asian British", 3 (1.9%) "Italian", 1 (0.6%) "Spanish", 1 (0.6%) "Scottish" and 44 (28.6%) as "Other".

### *Materials*

The study used the online Qualtrics experimental/survey software for presenting stimuli and obtaining responses. An initial "Screening questionnaire" determined whether participants had previous knowledge of Mandarin Chinese. They were asked to respond "Yes" or "No" to the following five statements: 1. I have studied Mandarin Chinese; 2. I know how to write my name in Chinese characters; 3. I have visited mainland China; 4. I have visited an area in which Mandarin Chinese is widely spoken; 5. I know the meaning of five or more Chinese characters. Data from participants who responded affirmatively to any of these statements were excluded from any analysis. The Anomalous Experience Inventory (AEI: Gallagher, Kumar, & Pekala, 1994) was used to assess participants' belief in anomalous events using the three main scales of "Experience", "Belief" and "Ability". The stimuli consisted of 24 pairs of Chinese characters, which comprised 24 real Chinese characters and 24 decoy (i.e., false) Chinese characters, with each pair (i.e., real vs decoy) matched in terms of number of strokes and complexity (see, Roe & Hitchman, 2011). The decoy characters were created by a native Chinese speaker/writer. Two primary lists (List 1 and List 2), which were matched for mean number of strokes and complexity were created. Then, the left/right positions of the Chinese characters within each of these primary lists were counterbalanced to produce a total of four lists (i.e., List 1, List 2, List 3 and List 4). An "attention check" question was used to ask whether participants left their PC and/or switched applications during the study. Finally, two 5-point Likert-type scale questions were presented. The first asked how motivated participants were to complete the task (on a scale from 1 = unmotivated to5 = very motivated). The second asked how pleasant they found the task (on a scale from 1 = unpleasant to 5 = very pleasant).

*Design*

This was a within participants design with order of the implicit/explicit task and stimuli list fully counterbalanced, see Table 1.

The study consisted of five phases. First, there was an *informed consent* phase, followed by *information capture* during which demographics and psi belief levels were captured. This was followed by either the implicit task or the explicit task (see Table 1).

The *implicit preference* task contained 2 phases. An initial *relaxation induction* phase followed by the *preference selection* phase. During the relaxation induction participants were shown an image of a star field and listened to relaxing new-age type music for 1-minute. In the preference selection phase participants were randomly presented with 12 pairs of characters side by side on the screen (see Appendix A). Their task was simply to identify, by clicking on the option below one of the characters, which character they "preferred". This process was then repeated for the remaining 11 pairs of characters. The dependent measure was whether or not the preferences expressed by the participants corresponded to the real Chinese characters. The expectation was that participants would *prefer* real Chinese characters significantly more than chance (i.e., 50%).

*Table 1.*

*Showing counterbalancing of the task type (Implicit vs Explicit) and list (List 1 to List 4)*

| **First Task** | **Second Task** |
|---|---|
| Implicit – List 1 | Explicit – List 2 |
| Implicit – List 2 | Explicit – List 1 |
| Implicit – List 3 | Explicit – List 4 |
| Implicit – List 4 | Explicit – List 3 |
| Explicit – List 1 | Implicit – List 2 |
| Explicit – List 2 | Implicit – List 1 |
| Explicit – List 3 | Implicit – List 4 |

| Explicit – List 4 | Implicit – List 3 |
| --- | --- |

The *explicit identification* task also contained two phases. An initial *relaxation induction* followed by the *identification* phase. During the relaxation induction participants were shown an image of a star field and listened to relaxing new-age type music for 1 minute. In the identification phase participants were presented with 12 randomly selected pairs of characters side by side on the screen. Their task was simply to identify, by clicking on the option below one of the characters, which character they thought was the "real" Chinese character. This process was then repeated for the remaining 11 pairs of characters. The dependent measure was the *accuracy* of the participant's response with the expectation that participants would be able to explicitly *identify* real Chinese characters at a level greater than chance (i.e., 50%).

The *final phase* required participants to answer questions relating to attending to the task, motivation and the pleasantness of the task.

*Procedure*

Participants were opportunity sampled from those that responded to a call to take part in an on-line study exploring the "Aesthetics of Language". Once participants clicked on the call "link" they were taken to the study. On accessing the initial welcome screen, the Qualtrics software pseudo-randomly allocated them to one of the four possible pathways, using an inbuilt Mersenne Twister pseudorandom number generator (PRNG), with the proviso that the PRNG evenly selected the four pathways. The PRNG uses the Unix timestamp, counted in milliseconds, as the seed for the random number generator. The study began by presenting an information-screening page informing the participant they are about to take part in a study that examines the "*Aesthetics of Language"*. No mention was made at the outset that this study was in fact examining possible morphic resonance effects. However, this was clearly explained in the debrief at the end. The information page explicitly stated that only those with no knowledge and/or understanding of Chinese characters should take part. There were 5 screening questions that participants had to complete that would be used to assess this. Once participants had read the information, completed the screening questions and provided informed consent they progressed to the information capture page, entered their demographic information and completed the selected sub-scales from the Anomalous Experiences Inventory (Gallagher et al., 1994). Participants then completed both the implicit preference task and the explicit identification task (with order counterbalanced across participants). Completion of the implicit preference task began with participants being shown an image of a star field along with some relaxing new-age type music for 1 minute with a verbal prompt to encourage them to relax. Once completed the computer then presented all 12 pairs of Chinese characters from one of the lists in a random sequence. Each trial pair of characters was presented on screen and remained on screen until participants selected the one they "preferred" by clicking on the relevant point below their chosen character. Once all 12 pairs of characters had been shown and the participant's responses obtained, the program proceeded onto the next phase, which in this instance was the explicit identification phase (counterbalanced across participants). Completion of the explicit identification task began with participants being shown an image of a star field along with some relaxing new-age type music for 1 minute with a verbal prompt to encourage them to relax. Once completed, the computer then presented in a random sequence all 12 pairs of Chinese characters from one of the lists. Each trial pair of characters was presented on screen and remained on screen until participants had selected the one they thought was the "real" one by clicking on the relevant point below the chosen character. Once the explicit identification task had been completed participants were then required to complete an attention check task followed by two Likert type questions relating to motivation and pleasantness. The attention check task asked them if at any time during the study they shifted screens to check emails, looked away from their PC, and/or were distracted by something else going on around them. The Likert-type questions asked how motivated they were to complete the task (on a scale from 1 = unmotivated to 5 = very motivated), and how pleasant they found the task (on a scale from 1 = unpleasant to 5 = very pleasant). Finally, participants were shown an information/debrief screen fully explaining the rationale and aims of the study and containing contact details of the Principal Investigator (PI) should they wish to obtain more information.

## RESULTS

Only data from participants that answered "No" to all five of the screening questions, and that fully completed all phases of both tasks as well as the post task attention check were included in the main analysis. As noted above, this left data from 154 participants. In addition, all statistical tests were conservatively left as 2-tailed to allow for the possibility that morphic resonance *could* impair performance as opposed to enhance it (see, Ritchie, Wiseman, & French, 2012). Descriptive data for performance on both the implicit and explicit tasks can be seen in Table 2.

### *Implicit preference*

The first confirmatory hypothesis tested whether participants implicit preference for *real* Chinese characters (i.e., those selected) was greater than chance (i.e., 6 or 50%). A one-sample t test comparing number of real characters preferred to chance showed that participants selected significantly fewer real Chinese characters than would be expected by chance (respective means: 5.66 vs. 6.0), $t(153) = -2.626$, $p = 0.010$, 95% CI (-0.60, -0.09), $d = 0.21$.

*Table 2.*

*Mean score and SD for the implicit preference task and explicit identification task*

| **Task** | **Mean** | **SD** |
|---|---|---|
| Implicit Preference | 5.66 | 1.63 |
| Explicit Identification | 5.77 | 1.87 |

### *Explicit identification*

The second confirmatory hypothesis tested whether participants explicit identification of *real* Chinese characters (i.e., those selected) was greater than chance (i.e., 6 or 50%). A one-sample t test comparing number of real characters identified against mean chance expectation showed no difference, (respective means: 5.77 vs. 6.0), $t(153) = -1.551$, $p = 0.123$, 95% CI (-0.53, 0.06), $d = 0.12$.

### *Comparison between implicit and explicit performance*

Exploratory analysis of a possible difference in effect size between performance on the implicit preference task and the explicit identification task was examined using a repeated measures t test. This showed no significant difference in effect size obtained on the implicit preference task (Mean effect size -0.215) compared to the explicit identification task (Mean effect size -0.152), t(158)=0.536, p=0.59, 95% CI (-0.29, 0.16), *d*=0.06.

*Correlations between performance and AEI*

Analysis of exploratory hypotheses 2a and 2bexamined the correlations between both implicit and explicit performance and participants' reported levels of belief in the paranormal using the AEI. These showed no significant effects (all ps>0.1) and are summarised in Table 3.

*Table 3.*

*Pearson correlations between implicit and explicit performance and the three sub-scales of the AEI*

| | Implicit Preference | | Explicit Identification | |
|---|---|---|---|---|
| | r | p | r | p |
| Belief | .110 | .174 | -.131 | .105 |
| Experience | -.092 | .254 | -.082 | .310 |
| Ability | -.083 | .306 | .071 | .383 |

## Discussion

The data shows that participants implicitly preferred real Chinese characters *less than* would be expected by chance. However, participants showed no ability to be able to explicitly identify real Chinese characters at a level that was distinct from chance. In addition, there was no difference in the magnitude of the effect found between the implicit preference task and the explicit identification task. There was also no clear association between implicit and explicit performance and participants' reported levels of belief in the paranormal using the AEI.

In contrast to our prediction, participants implicitly preferred the *decoy* characters to the real Chinese characters. A plausible and parsimonious interpretation is that participants preferred the decoy characters because there is something visually distinct and/or unique about them that they found intuitively appealing. Such intuitive responses may account for the effect emerging in the implicit preference task but not the explicit identification task. Though it should be noted that whilst the difference in identification rates of real versus decoy characters in the explicit identification task was not significant, the direction of the differences was consistent with that of the implicit preference task. In addition, this pattern of effects is consistent with those reported by Roe and Hitchman (2011). For example, Roe and Hitchman (2011) reported a trend where participants' recognition of the decoy Chinese characters (5.40) was higher than the real (5.22), though the difference was not significant. Furthermore, they also noted that participants falsely recognised more of the decoy Chinese characters (2.64) compared with the real ones (2.14) despite the fact that neither symbol had been previously presented. Such a pattern would parsimoniously suggest that there is something distinct about the decoy characters that participants found appealing.

Overall the findings fail to support the predictions that were derived from the theory of morphic resonance (Sheldrake, 2011). Nevertheless, it is worth considering why the outcome here is discrepant from some previous experimental tests (such as Mahlberg, 1987, and Robbins & Roe, 2010 — see Sheldrake, 2011, for an extended review). One difference in design between the current study and these earlier ones relates to the level of concerted effort applied by participants, which may be linked to the possible impact of running such a study online as compared to in a lab, as well as the personality traits of the individuals who agree to participate (e.g. for course credit rather than from intrinsic interest) and the geographic locality of the study in relation to the origin of the information which has been noted by others and may highlight potential methodological weaknesses in the current study which could have reduced its sensitivity to any potential morphic resonance effects.

For instance, Mahlberg (1987) has suggested that both exposure to the relevant material and an effort to learn may be required for any potential resonance effects to emerge. It is possible that running the current study online may have allowed participants to vary markedly in the degree to which they were solely attending to the task at hand (we recall here the experience of attending lectures and conference talks and noting how members of the audience tend to multitask, checking emails and social media, for example, while ostensibly following the presentation). With no facility to monitor participants directly, we cannot say with confidence that they actively engaged with the stimuli, and that their subsequent responses represented more than simply guessing. Indeed, it has been known for some time that running research studies online can be beneficial in greatly expanding the number of people willing to participate, but this may be at the cost of raising concerns about data quality and the generalizability of findings (Kraut et al., 2004). For example, lack of motivation when taking part in online studies has been shown to produce significantly higher dropout rates compared with similar research conducted in the laboratory (e.g., Williams, Cheung, & Choi, 2000; Williams et al., 2002). In addition, exploring possible precognitive effects using the retroactive priming paradigm made popular by Bem (2011) has led to one of us eliciting significant effects when testing in the laboratory (Vernon, 2015, 2018) but not when conducting the experiments online (Vernon, 2017a, 2017b). Hence, conducting the study online may have allowed or encouraged a lower level of engagement and/or missed a potentially important interaction between experimenter and participant that could facilitate the emergence of a resonance effect.Future research could address this by conceptually replicating this study in a laboratory under more controlled conditions and utilising a task that precluded simply guessing.

There are also indications that the personality profile of the individuals taking part in morphic resonance research may mediate the outcome. For instance, Mahlberg (1987) has suggested that those with an introverted attitude are more likely to exhibit morphic resonance effects. In addition, Robbins and Roe (2010) reported a positive relationship between transliminality and accurate recognition of real Chinese characters. In the current study we focused on the three sub-scales of the AEI, but these did not predict performance on the morphic resonance task; future research could revisit the dimensions of introversion and transliminality to see if earlier findings can be confirmed.

There is also a lack of clarity in terms of the degree to which a proposed morphic resonance effect would localise in space. For example, whilst the current study was run online and as such the precise geographic location of participants is difficult to identify, the study was advertised in the UK and very likely completed by individuals based in or around the UK. It is possible that the distance between the UK and China reduced the signal intensity and/or strength of any potential morphic resonance effects. Though speculative, such a proposal is consistent with the findings from Mahlberg (1987) who reported on a series of experiments carried out by Sheldrake which showed positive morphic resonance effects in Europe but did not replicate in the United States. Such a pattern is suggestive of a phenomenon that may be more localised in space.

Two further points regarding the current study that are worth considering are the counterbalanced order of tasks and the specific Chinese characters used. One aim of the present study was to compare possible morphic resonance effects elicited via an implicit task compared with an explicit one. However, task order was counterbalanced which meant that half of the participants completed the explicit task first. Hence, when completing the subsequent implicit task, they may have been attempting to guess which characters were real despite the instructions to simply identify the character they preferred. Such an approach would have meant that the cognitive processes involved in the implicit task may have also included unwanted explicit processes. This could be dealt with in future by either not counterbalancing the two types of task or by running them between separate groups of participants.

A final point relates to the Chinese characters used, both the real characters and the decoys. The real Chinese characters used in the current study were selected on the basis of their perceived commonality, though this was more intuitive than data-based. No account was taken of the empirical frequency of occurrence when selecting the Chinese characters. This may be important as word frequency has been shown to be an important variable in experimental psychology and is a robust predictor of decision times (Baayen, Feldman, & Schreuder, 2006). However, it is not clear as yet whether characters that currently have a high frequency count, denoting higher levels of contemporary use, would be more effective at eliciting a morphic resonance effect compared with more traditional characters that may be used less frequently in the modern era but have a longer history. As such, future researchers may want to examine these points in an effort to tease out any potential interaction with morphic resonance effects.

The decoy characters used were created by a native Chinese speaking individual with the constraints that they needed to conform to radical and total stroke count combinations to ensure visual similarity between real and decoy characters. It is difficult to judge with any degree of accuracy to what extent the judgement and artistic ability of this individual affected the outcome. One possible way of dealing with this would be to have multiple native Chinese speakers work collaboratively to create a wider set of decoy characters and have them drawn in a standardised font-based manner using computer software. Though it would still be difficult to make comparative judgments between real and decoy characters as the former set would have clear links to semantically based information whilst the latter would not. A potential alternative would be to compare real Chinese characters that are contemporary but have significantly distinct word frequency counts. Such an approach would avoid relying on the artistic abilities of one or more individuals to create coherent and consistently comparable decoys.

To conclude, in the present experiment we sought to test the predictions of morphic resonance theory using implicit and explicit versions of a task that consisted of presenting real and decoy Chinese words. Participants did not show the predicted preference for real words, and so we are not able to provide evidence in support of the theory. However, we do highlight some potential methodological issues that future researchers can address in an effort to further explore potential morphic resonance effects.

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APPENDIX A.

Main list of 24 characters with each pair containing a real Chinese character (on the left) and its decoy character (on the right).

**Real** **Decoy** **Real** **Decoy** **Real** **Decoy**

百 皀 帛 皇 皎 皅

虬 虿 虹 蚓 蛟 蛆

茜 酋 配 酊 酬 酾

隽 雀 售 隼 蜼 翟