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A Speculative Hypothesis on the Mechanisms of Deformation of Metal by Intention: A Modern Re-examination of the Work of Jack Houck

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Abstract: Here, we re-examine Jack Houck's work on the deformation of metal by intention (termed "warm forming") and present a speculative hypothesis to explain the phenomenon motivated by recent advances in materials science and parapsychology. We hypothesize that when a metal object deforms during warm forming, this is due to micro-PK influences affecting the movement of the specific crystalline defects in the metal object whose behavior and movement must be viewed quantum mechanically. The method used to derive this hypothesis is stated and likely has applications to other complex parapsychological phenomena. Ideal metal crystals are easy to theorize about because of their periodic nature, and an understanding of micro-PK gained from studying the warm forming phenomenon could be applied to better understand the effect of consciousness on biological systems.

Keywords: *human intention, theoretical parapsychology, micro-PK, macro-PK, consciousness*

Many phenomena relegated to the realms of parapsychology and alternative medicine would imply by their very existence that consciousness can directly interact with matter. Some modern conceptions of energy medicine are built on the idea that consciousness can directly impact living tissue (Jonas & Crawford, 2004). Veridical near-death experiences (Kelly et al., 2007, Chapter 6) and cases of apparent reincarnation (Tucker, 2008) seem, at face value, to imply that mind-matter interaction occurs constantly in the brains of healthy, awake humans. If consciousness can exist separately from the brain, then it must somehow act on the brain to influence neuronal processes in some way. While work on microscopic psychokinesis (micro-PK) has improved our understanding of the nature of potential mind-matter interactions (Varvoglis & Bancel, 2015), there remains no widely accepted theory to explain complex mind-matter interactions with biological tissue in terms of simpler mind-matter interactions similar to those historically studied in micro-PK experiments. It is, perhaps, desirable, in order to better understand the potential effect of consciousness on biological tissue, to search for and study simpler macroscopic systems that seem to be overtly responsive to conscious intent.

In this paper, we will examine the possibility that small metal objects with a large number of dislocations in their microstructure meet this criterion. Solid metal is easy to theorize about, as the symmetry of the atomic lattice of an idealized flawless metal crystal can be exploited to generate powerful mathematical results. This is the case in the proofs of Bloch′s theorem, which gives the wave functions of electrons in crystalline solids (Ashcroft & Mermin, 1976, p. 134). From 1981, continuing through 2003, parapsycholo-

gist Jack Houck studied the effects of intention on metal extensively (Houck, 2003). Here, we will examine his empirical findings and anecdotal observations concerning the deformation of metal by intention– a form of macroscopic psychokinesis (macro-PK). We will then survey relevant parapsychology and materials science results, state a speculative hypothesis to partially explain Houck's observations, and enumerate some experimental techniques that could eventually test refinements of the stated hypothesis. We hypothesize that when a metal object deforms due to intention, it is due to micro-PK influences affecting the movement of the specific crystalline defects in the metal object whose behavior and movement must be viewed quantum mechanically. Such defects have been demonstrated to exist, and we survey the literature on the subject. Our entire hypothesis is framed in the context of Lucadou's work, which paints micro-PK not as a force that directly influences the outcome of probabilistic quantum events but as a more subtle force that induces correlations between the probabilistic outcomes of quantum events and meaningful events taking place at the macroscopic scale (Walach et al., 2020).

Evidence On the Deformation of Metal by Intention Gathered by Jack Houck

Historical Background

Jack Houck is known in the parapsychology community for his work investigating the effects of alleged macro-psychokinesis on metal objects. Houck was an aerospace engineer by training and managed a research group at McDonnell Douglas from 1970 until 1990. James McDonnell, a founder of McDonnell Douglas, had a keen interest in parapsychology and, in 1980, allowed Houck to participate in the implementation of a remote viewing experiment in which remote viewers attempted to perceive remote locations (unknown to them during the experiment) through extrasensory perception. Houck recounted that remote viewers in the experiment were often able to acquire details about target locations accurately. However, the details they acquired were often from emotionally charged events that occurred at the target locations in the past and did not accurately describe the locations in their present state. There appeared to be a "time-shift" effect in the data produced by remote viewers. At this point in his life, Houck was spending much of his free time reading parapsychology literature and had already begun actively participating in the parapsychology research community. In a talk given by Houck, he hypothesized that (1) the "time-shift" effect he was seeing in his remote viewing experiments could be mitigated by creating a "peak emotional event" at the target location in the present and (2) that "peak emotional events" would make psychokinesis easier to perform.

To test his hypothesis, Houck, in collaboration with metallurgist Severin Dahlen, set out to create a "peak emotional event" of his own in his home in the form of a party. Dahlen claimed to have had previous experience teaching people to use psychokinesis to act on metal objects. In 1981, Houck hosted the first "PK party" in his home in Huntington Beach, California. All 21 attendees were promised that they would learn how to "bend metal with [their] minds" (Houck, 2003, p. 56). Roughly half of the attendees were invited to the party specifically to participate in remote viewing experiments. Houck provided partygoers with his grandparents' sterling silverware collection and some zinc-coated steel rods to attempt to bend. Under the instruction of Dahlen, many party attendees could perform what they believed to be psychokinesis on the provided metal objects after concentrating on them in the upbeat group setting. Participants described metal objects as "getting warm or sticky, with the metal becoming very soft, like

rubber, for five to 30 seconds" (Houck, 2003, p. 56), in which time they could easily bend them. Cases of "spontaneous bending," in which pieces of silverware would purportedly bend by themselves while being held, were also reported (Houck, 2003). Experiences and observations similar to these were commonplace at subsequent PK parties (Houck; Houck, 1983). The phenomenon was so common that Houck coined a name for the process of bending metal objects in the warm, malleable state: "warm forming" (Houck, 1984). Between 1981 and 2003, Houck would go on to conduct over 361 PK parties attended by over 17,000 people (Houck, 2003). In 2010, Jack Houck was given the Dinsdale Award by the Society for Scientific Exploration in recognition of his contributions to the field of parapsychology and efforts to put psi phenomena in the hands of the general public.

The precise instructions that Houck gave his party guests to convince them that they could use psychokinesis to bend metal objects varied slightly over the years. However, the core of his methodology can be summarized succinctly. Firstly, party guests were led through a visualization exercise to get them to concentrate on the metal object that they were attempting to bend. Secondly, they were instructed to shout "Bend! Bend! Bend!" at their metal objects while making a conscious effort to focus intensely on them. Then, they were instructed to sit back, forget about "the bending objective," and continuously feel their metal objects to detect the short time window in which they were warm, sticky, and malleable. Houck would sometimes go around to guests and purposely break their concentration. This method would lead to over 85% of party attendees successfully doing warm forming (Houck, 1982). Houck would attempt to lead partygoers through three stages of successively harder warm forming tasks to slowly get them acquainted with the feeling and idea of warm forming (Houck, 1988).

Empirical Evidence

Analysis of the Surface of a Warm Formed Steel Rod: During a PK party in April of 1981, a 30.5 cm long and 0.63 cm thick segment of a rod made of zinc-coated 1018 steel was warm formed over the course of 15 minutes. The rod segment and a control segment cut from the same original rod were analyzed at a metallurgical laboratory by Victor Kerlins. Before being cut up for use at a PK party, the original rod was cleaned with gasoline and polished with 0000 steel wool. For safety reasons, the sharp edges of the rod segments used in the party were filed down. The party attendee who warm formed the rod reported that, according to Houck, "when the rod became warm and was easily malleable, a permanent color change occurred over the entire surface of the rod (not just where the bend occurred)." Houck stated in his report on the rod that he was, at the time, in possession of nine other rods that underwent similar color changes during warm forming. Both of the rod segments (see Figure 1) were examined with optical and scanning electron microscopes as well as with energy-dispersive X-ray diffraction analysis (to determine what chemical compounds were directly responsible for the color change) and an X-ray map examination (to determine if any zinc from the zinc coating penetrated into the steel).

The energy-dispersive X-ray diffraction analysis determined that the black color on the surface of the warm formed rod was due to the presence of chlorine, likely in the form of zinc chloride. Houck suspected that the source of the chlorine was either salt or hydrochloric acid from the hands of the party attendee who warm formed the rod. He noted, however, that human hands regularly handled both the control rod and warm formed rod segments, so routine handling can be ruled out as the source of the dark color on the surface of the warm formed rod segment. Due to the presence of zinc on the rod segment, the test

could not detect the presence or absence of sodium. The surface color changes were uniform across the entire surface of the rod and did not vary between the straight and bent portions. An X-ray map examination on cross sections of both rod segments indicated that zinc from the rod's coating did not penetrate into the underlying steel. No direct pictures of the grain structure of either rod segment were taken during the analysis (Houck, 1984).

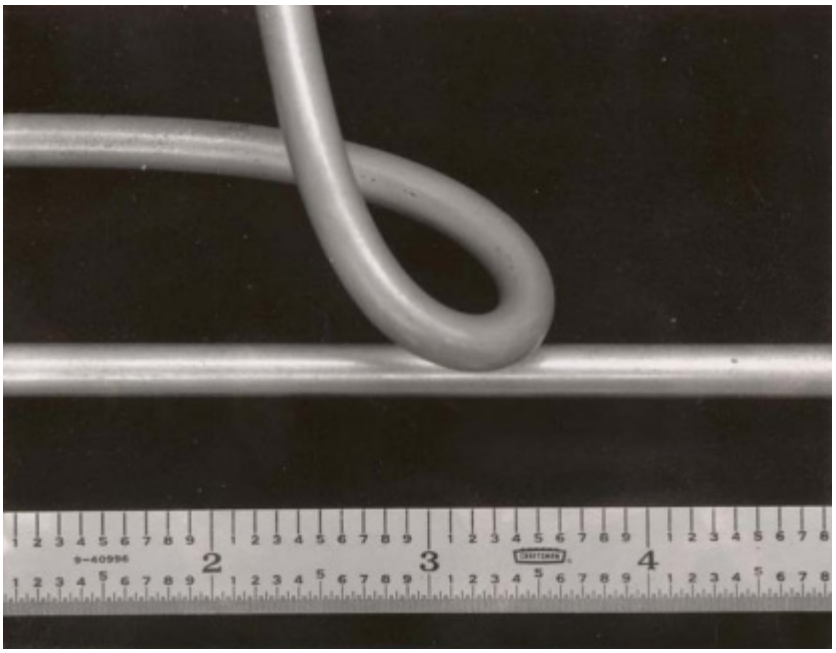


Figure 1. Warm formed steel rod segment (top) with control steel rod segment (bottom). Image reprinted with permission (Houck, 1984).

Analysis of the Microstructure of a Warm Formed Aluminum Rod: In May of 1981, a warm formed ⅜ inch-diameter aluminum rod bent into a loop (similar to the loop in Figure 1), together with a ⅜ inch-diameter "manually formed" aluminum rod (also bent into a loop), was analyzed in a McDonnell Douglas laboratory by Victor Kerlins. He found that grain boundary cracking occurred at the outside diameter of the bends in both rods, but not in the inner diameter of the bends. Examination with optical and scanning electron microscopes with magnification up to 11kx found "no significant differences in microstructure" between the two rods. This analysis included the use of "polarized light and Nomarski phase interference contrast techniques." Kerlins noted that the inside of the warm formed rod contained many deformation bands, but these are common inside plastically deformed metals. The hardness of cross sections of both rods taken from their bent portions was measured to be the same using Rockwell microhardness testing with a 100g load. Figure 2 shows two images from Kerlins' analysis (Kerlins, 1981).

Figure 2a

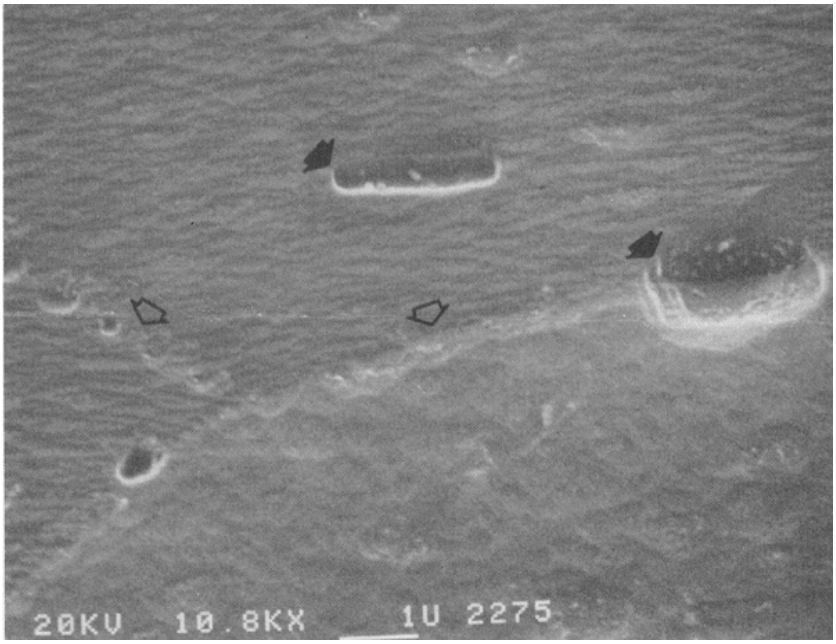


Figure 2b

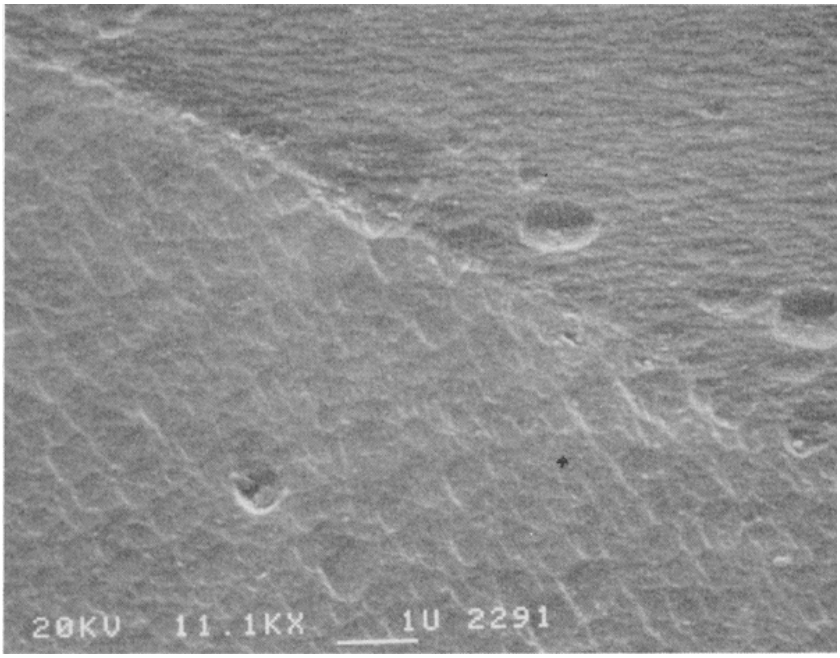


Figure 2. (a) Polished cross-section of a warm formed aluminum rod treated with Keller's reagent at 10.8kx magnification. Open arrows denote grain boundaries, and solid arrows denote pits created during polishing. (b) Polished cross-section of a manually formed aluminum rod treated with Keller's reagent at 11.1kx magnification. Images reprinted with permission (Kerlins, 1981).

The Hardness of Hacksaw Blades Repeatedly Exposed to PK Parties Decreases: Severin Dahlen conducted an experiment to examine the effects of indirect macro-PK influence on the hardness of metals. Four hacksaw blades made of high-carbon steel were acquired. Each blade had its surface inspected for irregularities prior to the experiment. One blade was set aside as a control sample at a location where no PK parties took place. The other three were exposed to a PK party environment repeatedly, but party participants were not made aware of this (Dahlen, 1985). The three experimental blades were kept in a brown paper bag at the center of various PK parties (Houck, 1993). Overall, the experimental blades were exposed to four PK parties spaced out over three months.

At the beginning of the experiment and throughout the three-month interval, all four hacksaw blades' hardnesses were measured using a Rockwell Superficial Scale 15N equipped with a 15KG load and a diamond indenter. Hardness was measured at six points on each of the four blades (three places on each side of the blades). The values of the six measurements were averaged together after each set of measurements. Figure 3 shows a graph of the measurements annotated with a timeline of events. It was found that the hardness of the experimental blades decreased significantly throughout the experiment, while the hardness of the control blade remained roughly the same. The experimenters interpreted this as evidence of annealing taking place after exposure to an unknown force termed "remote annealing radiation" (Dahlen, 1985).

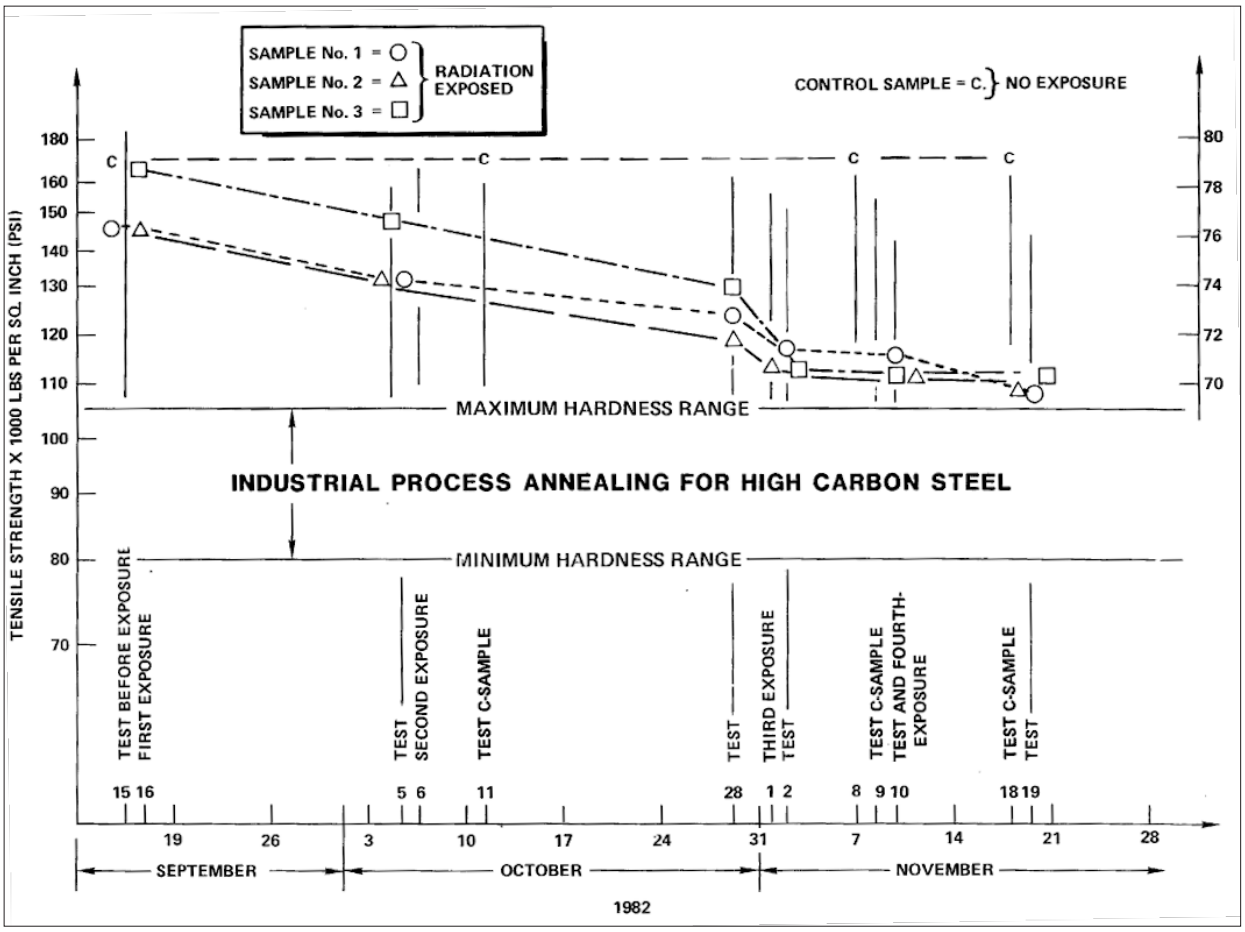


Figure 3. A reproduction of Figure 2 of Dahlen's paper summarizing the result of his hacksaw blade experiment (Dahlen, 1985).

Number of People for a Successful PK Party: Houck kept meticulous records concerning the PK parties he hosted and retained information regarding party attendance and warm forming attempt success rate. He noted that the ideal PK party size was between 15 and 40 people. Any more or fewer party attendees would cause participants' warm forming success rate to decrease. He speculated that at bigger parties of more than 40 people, this was due to individual attendees not getting enough personalized instruction from party hosts. Houck noted that even at large parties, one host per 20 people still produced a high warm forming attempt success rate. He also notes that most unsuccessful smaller parties occurred early in his psychokinesis work, but wanted to go so far as to define a PK party as "a group of 15 or more people who meet to bend metal using psychokinesis" (Houck, 1983).

Anecdotal Evidence

Over the course of running PK parties for decades, Houck made some unquantified anecdotal observations that could be useful in gently guiding theory development. According to Houck, two factors determine if a specific piece of metal is susceptible to PK influence: the number of dislocations in the metal and the thermal conductivity of the metal. The more dislocations a piece of metal has, the easier it is to warm form. Pieces of metal with lower thermal conductivity are easier to warm form solely because it is easier for people performing warm forming to recognize the short time window in which these specimens feel warm and malleable (Houck, 1983). Metals with high thermal conductivity, such as copper and silver, become hot to the touch during warm forming attempts, and partygoers would sometimes have to drop specimens with high thermal conductivity to avoid getting burned (Houck, 1988). Houck believed that everyone is capable of warm forming and reported that roughly half of the people who successfully warm formed during his parties could later warm form on their own (Houck, 2003).

Even though PK allows people to bend strong metal objects with significantly reduced force, the phenomenon has limits. According to Houck, it is generally impossible to bend objects "too far beyond human physical bending capability" with PK (Houck, 1982). It is also difficult to warm form cast metals (Houck, 2003) and metals that have been annealed (Houck, 1983). Warm forming is not necessarily a permanent process. Objects do not always maintain their shape after being warm formed. Metal that has been warm formed often continues to bend by itself (sometimes for several days) after all warm forming attempts have ceased (Houck, 2003). Houck suspected that spontaneous bending during the PK process, which was often observed, was due to preexisting internal stresses in the metal being PKed, similar to the well-understood metallurgical process of "creep" (Houck, 1988).

Analysis of Jack Houck's Evidence

While Houck's position at McDonnell Douglas gave him access to some of the best available scientific equipment to analyze warm formed pieces of metal, the fact remains that much of Houck's empirical evidence lacks adequate, standard, scientific controls. This is not due to negligence on his part. It is simply the nature of the phenomena he studied, which tends to, per his account, only occur sporadically in a chaotic social setting (Houck, 1982). We have no way of being sure that any of Houck's specimens were genuinely warm formed, and not bent with mechanical force alone. Presumably, Houck and his associates made every effort to collect and analyze only the best, least suspect specimens possible. Even so, we must

view all empirical evidence resulting from the analysis of warm formed specimens gathered at PK parties as tentative. We will proceed in our analysis of Houck's evidence with this in mind.

Houck's rod analyses demonstrated that warm forming does not affect the larger features of metals' microstructure. By his tests, both of the rods that Houck had examined were indistinguishable from metal rods bent by conventional mechanical means. The only potential anomaly observed during the rod tests was the presence of chlorine deposits on the surface of the warm formed steel rod. Perhaps the chemical reaction that caused their formation was catalyzed by the mysterious process that causes metal to feel soft, warm, and malleable for brief periods of time during warm forming. In this case, it is impossible to rule out simple friction as the catalyst, especially since "gentle rubbing" was sometimes part of the warm forming process (Houck, 1982).

Dahlen's hacksaw blade experiment seemingly demonstrates that something unusual was going on at Houck's PK parties. Per the presented results, it is clear that prolonged exposure to the PK party environment altered the microstructure of the experimental saw blades somehow, ultimately decreasing their hardness. It is worth reiterating, however, that the saw blades were never the subject of warm forming attempts and were only exposed to an environment where warm forming was occurring. Dahlen's results, demonstrating an easily observable change in microstructure, do not contradict the results of the analyses showing that the microstructure of objects directly subjected to warm forming does not appear abnormal for plastically deformed metal objects. While Dahlen pointed out that the process that the experimental hacksaw blades underwent is similar to annealing, his evidence only established that the experimental hacksaw blades decreased in hardness. He never established that an annealing process occurred. Presumably, the effects observed by Dahlen were not the result of one individual acting upon the experimental blades (none of the party attendees were aware of the blades' presence) but the cumulative result of being acted upon by all PK party attendees (likely numbering over 15) during multiple parties.

It is impossible to draw any authoritative conclusions from Dahlen's experiment, however, without at least one independent replication of the effects that he observed. While the presence of a control sample with unchanging hardness constitutes evidence that the hardness scale remained calibrated correctly throughout the duration of the experiment, there were no controls around the handling of the three experimental hacksaw blades. It is a well-known fact that corrosion can weaken the tensile strength of metal, and it is unknown if any corrosion occurred on any of the blades over the three-month period in which they were being tested. A replication of the experiment should control for the humidity exposure and temperature of the blades involved throughout the duration of the experiment. Furthermore, Dahlen's results are presented crudely without a proper statistical analysis. A replication should be more rigorous in its analytical approach.

It should also be noted that there are empirical grounds to view any testimony originating from PK party participants with a degree of suspicion. In a 2005 psychology study, researchers were able to lead participants to report that a key allegedly bent via what Houck would call warm forming was "still bending" when it objectively was not by using verbal suggestion (Wiseman & Greening, 2005). The type of verbal suggestion the participants were subjected to was not unlike the type of suggestion that would almost certainly be present in a PK party environment. Historically, it has been very difficult, if not impossible,

for well-intentioned scientists to observe warm forming *outside of* a PK party (Pamplin & Collins, 1975). Claimed successes certainly exist (Hasted, 1981), but they are not without controversy (Randi, 1978).

The Classical and Quantum Physics of the Plastic Deformation of Metals

To form a hypothesis on what might be occurring inside a piece of metal undergoing warm forming, it is useful to survey some relevant facts from physics and materials science. In crystalline solids such as metals, the mechanism responsible for plastic deformation (permanent shape change due to applied force) is dislocation motion, which occurs in a process called *slip*. In this context, dislocations are small misalignments and mismatches in the normally periodically repeating sheets of atoms that comprise metal crystals. Dislocation motion allows planes of atoms to slide over each other incrementally (along *slip planes*) as the mismatches are pushed through the atomic lattice instead of requiring that every bond between the moving planes be broken simultaneously. This significantly reduces the average amount of force necessary to make planes of atoms in metal slide over each other (Callister & Rethwisch, 2018).

It follows logically from this that anything that hinders dislocation motion will make a piece of metal harder to plastically deform. Point defects in crystal lattices, such as interstitial impurities (foreign atoms wedged into the crystal lattice), interact with moving dislocations. More energy is required for a dislocation to move past an interstitial impurity than through a flawless section of atomic lattice (Hull & Bacon, 2011, Section 10.4). An overabundance of dislocations can impede dislocation movement by making it more likely that dislocations run into each other. This dislocation interaction is the basis for "work hardening" (Black & Kohser, 2008, Section 3.11). In some cases, the dynamics of dislocation and interstitial impurity movement can only be understood by treating the dislocations and interstitial impurities, which are on the scale of atoms, quantum mechanically.

For example, accurately computing the diffusivity of hydrogen atoms trapped in a steel crystal (an example of interstitial impurities) requires treating individual atoms (which here are best viewed as free protons floating through a soup of electrons) as though they are spread out across multiple crystal lattice cells. Such a treatment is necessary to explain the diffusion activation energy of hydrogen in steel at room temperature. Formally, a diffusing hydrogen atom is treated as a quantum mechanical harmonic oscillator confined to a tetrahedral lattice cell. The periodicity of the underlying lattice is taken into consideration by specifying a tight-binding model hopping integral (Paxton, 2014). The value of the hopping integral specifies entries in the Hamiltonian matrix that would be used to model the wandering of the hydrogen atom from one lattice cell to neighboring cells. Tight-binding models are fundamentally approximations that simplify calculations without giving up too much predictive power. In this case, the model takes into consideration the possibility of hydrogen atoms hopping to neighboring lattice cells but not further (so most elements of the Hamiltonian matrix are zero). There is certainly a possibility that hydrogen atoms hop further than this, potentially skipping over some lattice cells. However, the probability of this occurring is so small that it is generally regarded as negligible. For a good introduction to tight-binding models, which were originally applied to electrons moving between atoms and not atoms moving between lattice cells, see Chapter 11 of "The Oxford Solid State Basics" by Simon (2013).

Like interstitial impurities, the dynamics of dislocation movement have a pronounced quantum mechanical aspect. In solid copper, dislocation kinks (small step-like bends in dislocations that reside in the

slip plane) in screw dislocations can quantumly tunnel through the atomic lattice that contains them. At first glance, this is quite peculiar, given that these kinks are structures composed of hundreds of atoms. It is exceptionally abnormal for such large structures to quantumly tunnel. There is a good explanation for this behavior, justified by atomic simulations based on interatomic potentials.

A dislocation kink is an arrangement of metal atoms in the same way that a ripple in a pond is an arrangement of water molecules. As a kink moves, it becomes composed of new atoms. It is not by itself a collection of specific atoms. When a kink in a screw dislocation in copper moves by one atomic length, each individual atom that shifts as a result of the movement only shifts a small fraction of a lattice cell width– no more than approximately 0.1Å at most. As a result of this, the energy required to make a dislocation kink move is estimated to be on the order of 0.1μeV, which is 10^5 times smaller than the energy required to move a dislocation jog (a small step-like bend in a dislocation that bends out of the slip plane). This "kink-migration barrier" is small enough that heat and quantum fluctuations can both reasonably be expected to cause these kinks to move (Vegge et al., 2001).

What Processes Can Micro-PK Affect?

It is crucial to understand micro-PK not as a force that bends the behavior of quantum systems outside of the probabilistic laws of quantum mechanics, but rather as a force that induces meaningful correlations between the random outcomes of quantum events and events occurring at macroscopic, human-sized scales. This concept is illustrated well by Lucadou's fractal experiment, which appears to be easily reproducible. In the experiment, volunteers are individually placed in front of a computer screen with a fractal on it. A portion of the fractal is colored, and when the volunteers hit the left or right "shift" keys, the portion of the fractal that is colored changes by moving in some direction in a continuous manner based on data obtained from a quantum random number generator. They are shown on-screen instructions telling them which way the colored portion of the fractal should be moved (to the left, right, or middle of the screen) and instructed to use their intention to make the motion of the colored portion conform to these instructions after every "shift" key press. The volunteers are allowed to press the shift key(s) of their choice a large but predetermined number of times. During the experiment, many "physical" quantities pertaining to the output of the quantum random number generator are recorded, and many "psychological" quantities pertaining to the behavior of the volunteers during the experiment are recorded. Immediately after each volunteer participates in the experiment, a new set of "physical" quantities is recorded from the quantum random number generator without a human operator attempting to influence them, and the results are set aside as a control dataset.

Some examples of "physical" quantities recorded in these experiments are the number of times the motion of the fractal conformed to the movement direction instructions, the mean voltage output of the quantum random number generator, and the standard deviation of the voltage output of the quantum random number generator. Some examples of "psychological" quantities include the number of left "shift" key presses, the number of right "shift" key presses, and the mean time between key presses. After the experiment, a table is created with every "physical" quantity observed during the experiment assigned to a row and every "psychological" quantity observed during the experiment assigned to a column. The Spearman's correlations between the quantities assigned to the rows and columns are computed, and the table is populated. The number of correlations in the table meeting an arbitrary predeter-

mined significance threshold is counted for each volunteer participating in the experiment, and this count is set aside. The same correlation count statistic is computed for each volunteer using their control dataset, and this count, too, is set aside. The difference between the experimental and control correlation count is then computed for each volunteer, and these difference values are used as input to the next stage of statistical analysis.

In the next stage of statistical analysis, a nonparametric permutation test is conducted with the experimental and control datasets to determine the likelihood that the differences calculated in the previous stage occurred by chance (the null hypothesis). A 2019 replication of this experiment rejected the null hypothesis with a p-value of 0.0177. Lucadou and his colleagues view the results of this experiment and its replications as evidence that micro-PK does not exert a direct causal effect on the outcome of random quantum events. Instead, it induces an "entanglement-like" correlation between the outcomes of quantum events and meaningful events occurring at macroscopic scales (Walach et al., 2020). An experiment examining the effect of concentration on an array of quantum random number generators has demonstrated that concentration can induce a correlation between the outputs of individual random number generators in the array (Carpenter et al., 2021), giving further support to Lucadou and his coauthors' interpretation of their results. So, what sorts of microscopic effects should we look for when analyzing a macroscopic system that we expect to be influenced by micro-PK?

Theoreticians cannot invoke micro-PK as a trump card to postulate that arbitrary microscopic phenomena are occurring. We should not expect micro-PK to haphazardly snap chemical bonds en masse or directly bias the outcome of individual quantum events beyond their probability distributions determined by quantum mechanics. At best, micro-PK can affect a macroscopic system by inducing correlations between conscious intent and the individual probabilistic quantum mechanical events inside of it, but only if the system's macroscopic behavior is determined in some way by the outcome of these probabilistic quantum events. The correlation here is posited to be strictly between intention and the outcome of individual quantum events, not between pairs of quantum events. In order for a macroscopic PK effect to be realized, it must be possible to realize the effect as a plausible outcome of the normal time-evolution of the system's Hamiltonian. The macroscopic system itself must be treated as an open quantum system. This view echoes the sentiment of Jean Burns, who theorized that PK interactions work by "ordering" quantum fluctuations "within the limits of the uncertainty principle" (Burns, 2006). The challenge of realizing a macroscopic PK effect is akin, in a way, to solving a Sudoku puzzle, as nature must realize the effect, if possible, by selecting from a number of allowed, plausible time evolutions. This is done automatically in a law-like way, almost as if an action integral of some sort is being implicitly minimized (Hendel, 2025).

Hypothesis

The central hypothesis of this paper is that when a metal object being warm formed briefly becomes significantly more malleable than usual, this is due to micro-PK influences affecting the movement of specific crystalline defects in the metal object whose behavior and movement must be viewed quantum mechanically. Given Houck's anecdotal observation that metals with more dislocations are easier to warm form, it is likely that dislocations (or at least some specific types of dislocations, perhaps with additional properties) play a pivotal role in this process. Under normal circumstances, one would expect metals with more dislocations to be harder to plastically deform due to dislocations running into each other, but for

some reason, during warm forming, the opposite is true. Based on our current understanding of micro-PK, we should expect that the malleable state occurs when the random motions of various crystalline defects become harmonized in some way, but do not flippantly disobey their probability distributions specified by the laws of quantum mechanics. In reported cases of deformation of metal by intention, there is, generally, still force being applied to the metal object as it is being bent. It is only necessary for this posited harmonization to prevent the crystalline defects, which are being moved by mechanical force, from getting tangled with or bumping into each other to some degree.

In its current form, this hypothesis is not directly falsifiable because it is not specific enough to be. It does not specify what defect interactions are influenced to give rise to the warm forming phenomenon or how specifically they are being influenced. It will likely not be possible to amend this hypothesis to be falsifiable without more empirical observations of the microstructure of warm formed metal objects. Houck and his contemporaries never examined warm formed metals closely enough to spot potential abnormalities in the interactions and motion of lattice imperfections with widths on the atomic scale. However, some of his observations could pave the way towards theory development. Houck's anecdotal observation that warm formed metal sometimes continues to bend by itself for up to several days is extremely valuable. If empirically true, this fact would imply that warm forming leaves metal in a fundamentally unstable state, likely involving unevenly distributed internal stresses. This unstable, final state (which presumably deterio-rates entirely within a few days after warm forming) could be the target of future observations.

Regardless of the process involved in the state decay, it appears that the decay process itself either induces or releases residual stresses in metal objects, which can be easily measured using standard techniques such as X-ray diffraction. Modern X-ray diffraction techniques can be made to have very high spatial resolution on the order of 5-10μm (Winiarski et al., 2016), but these techniques can only measure residual stresses a small distance below exposed metal surfaces (Fitzpatrick et al., 2005). It should be possible to construct an experiment in which a number of warm formed objects have residual stress measurements taken in many locations repeatedly at fixed time intervals immediately after warm forming and continu-ing for several days. Observations about time-varying residual stresses should be easy to make and could prove helpful to theory development. Many commercially available X-ray diffraction devices are small and portable and could be used on-site at a PK party. Any experiment done on warm formed objects will have to take into account the possibility that any single warm formed object in any specific experiment might not have been warm formed to begin with. In all experiments involving warm forming, there is always a possibility that volunteer warm formers have deluded themselves into genuinely believing that they have done warm forming when, in reality, they have just used mechanical force.

Based on Houck's anecdotal observations, it should be easy to blindly distinguish between a group of metal objects that has been bent via mechanical action and a group of metal objects that has been bent via warm forming. For each metal object in both groups, pick some number of equidistantly spaced points on the object (thirty, say) and measure the residual stresses at the thirty points on every object every few hours for a few days. The stresses at the individual points in the warm forming group should change more over time than the stresses at the individual points in the mechanical action group. A linear mixed-effects model with random intercepts and random slopes could be used to rigorously quantify the changes and determine if they are significant. The residual stress data here is structured in four levels: (1) time, (2) measurement locations, (3) metal objects, and (4) group (mechanical action vs. warm forming). Such an

experimental setup would allow an effect to be recognized even if some portion of the warm forming group was only bent via mechanical action. The mechanical action specimens in the warm forming group would themselves be indistinguishable from the specimens of the mechanical action group, but a small number of genuinely warm formed specimens in the warm forming group would make the warm forming group in its entirety statistically different from the mechanical action group.

Given Houck's anecdotal observations on the role of dislocations in warm forming, throwing every trick in the book at warm formed objects on this front might be productive. Standard dislocation observation techniques such as transmission electron microscopy, decoration methods, and field ion microscopy can be used to gather more information on any atomic-scale anomalies in the microstructure of warm formed metal objects. Field ion microscopy can additionally be used to observe the position of lattice vacancies (Hull & Bacon, 2011, Chapter 2). Here again, the potential existence of some decay process following warm forming should be taken into account. Observations concerning warm formed objects should be made repeatedly at fixed time intervals in the days following warm forming, ideally starting immediately after warm forming has been completed.

Historical Context of Hypothesis

The hypothesis presented here is original but not entirely unprecedented. Before Houck discovered a method that allows average members of the general public to perform warm forming, research on "paranormal metal-bending" focused on gifted experiment participants. A detailed bibliography of pre-Houck work on the deformation of metal by intention is included in David Robertson's paper "Material Deformation," presented at the 2003 "Science and Whole Person Healing" conference. In 1977, four years prior to Houck's first PK party, J. B. Hasted and David Robertson speculated that "the formation of loop and other dislocations" is a "primary" mechanism in psychic metal bending and went on to conjecture that this mechanism "may well be connected with the role of the observer in quantum mechanics." This hypothesis is based on empirical observations made by Crussard and Bouvaist while working with experiment participant Jean-Pierre Girard. Hasted and Robertson even went so far as to suggest that the mechanism be referred to as "mentally induced tunnel effects" despite lacking a modern understanding of the role of quantum mechanical processes in the plastic deformation of metal. The pair subscribed to the hypothesis that a quasi-viscous-creep-like process occurs during paranormal metal-bending that is allowed to occur due to thin layers of atoms on grain boundaries temporarily melting (Hasted & Robertson, 1977). This idea seeped into Houck's theoretical work, as he postulated an identical hypothesis to explain warm forming (Houck, 2003).

Conclusion

We have reexamined the work of Jack Houck from a modern perspective. Significant progress has been made in materials science and parapsychology since the 1980s, when Houck produced the bulk of his work. The recent development of new, innovative, and replicable micro-PK experiments, coupled with a modern understanding of the role of probabilistic processes in the plastic deformation of metal, offers contemporary observers a perspective on warm forming that was not available to Houck and his colleagues. Further experimentation on the deformation of metal by intention has the potential to lead to the development of a general theory of macro-PK that treats macro-PK events as collections of distinct

micro-PK events. A better understanding of the mechanisms underpinning warm forming can likely be acquired using standard experimental techniques.

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Una Hipótesis Especulativa sobre los Mecanismos de Deformación del Metal por Intención: Una Reexaminación Moderna del Trabajo de Jack Houck

Resumen: Aquí reexaminamos el trabajo de Jack Houck sobre la deformación del metal por intención (denominado "conformado en tibio" o warm forming) y presentamos una hipótesis especulativa para explicar el fenómeno, motivada por avances recientes en ciencia de materiales y parapsicología. Hipotetizamos que cuando un objeto metálico se deforma durante el conformado en tibio, esto se debe a influencias de micro-PQ que afectan el movimiento de defectos cristalinos específicos en el objeto metálico, cuyo comportamiento y movimiento deben ser interpretados desde la mecánica cuántica. Se expone el método utilizado para derivar esta hipótesis, el cual probablemente tenga aplicaciones a otros fenómenos parapsicológicos complejos. Los cristales metálicos ideales son fáciles de teorizar debido a su naturaleza periódica, y la comprensión de la micro-PQ obtenida del estudio del fenómeno de conformado en tibio podría aplicarse para entender mejor el efecto de la consciencia sobre los sistemas biológicos.

Palabras clave: *intención humana, parapsicología teórica, micro-PQ, macro-PQ, consciencia*

Eine spekulative Hypothese zu den Mechanismen der Verformung von Metall durch Intention: Eine moderne Neubetrachtung der Arbeiten von Jack Houck

Zusammenfassung: Wir überprüfen Jack Houcks Arbeiten zur Verformung von Metall durch Willenskraft (als „Warmformung" bezeichnet) und stellen eine spekulative Hypothese zur Erklärung dieses Phänomens vor, die durch aktuelle Fortschritte in der Materialwissenschaft und Parapsychologie angeregt ist. Wir stellen die Hypothese auf, dass die Verformung eines Metallobjekts während des Warmformens auf Mikro-PK-Einflüsse zurückzuführen ist, die die Bewegung spezifischer Kristallfehlstellen im Metallobjekt beeinflussen, deren Verhalten und Bewegung quantenmechanisch betrachtet werden müssen. Die zur Herleitung dieser Hypothese verwendete Methode wird dargelegt und lässt sich vermutlich auch auf andere komplexe parapsychologische Phänomene anwenden. Ideale Metallkristalle lassen sich aufgrund ihrer periodischen Struktur leicht theoretisch beschreiben, und ein durch die Untersuchung des Warmformungsphänomens gewonnenes Verständnis von Mikro-PK könnte genutzt werden, um die Wirkung des Bewusstseins auf biologische Systeme besser zu verstehen.

Schlüsselbegriffe: *menschliche Intention, theoretische Parapsychologie, Mikro-PK, Makro-PK, Bewusstsein*

Une hypothèse spéculative sur les mécanismes de déformation de métaux par l'intention : un ré-examen moderne du travail de Jack Houck

Résumé : Nous réexaminons ici les travaux de Jack Houck sur la déformation du métal par l'intention (appelée « formage à chaud ») et présentons une hypothèse spéculative visant à expliquer ce phénomène, inspirée par les avancées récentes en science des matériaux et en parapsychologie. Nous émettons l'hypothèse que lorsqu'un objet métallique se déforme lors du formage à chaud, cela est dû à des influences micro-PK affectant le mouvement de défauts cristallins spécifiques dans l'objet métallique, dont le comportement et le mouvement doivent être considérés sous l'angle de la mécanique quantique. La méthode utilisée pour déduire cette hypothèse est exposée et pourrait trouver des applications à d'autres phénomènes parapsychologiques complexes. Les cristaux métalliques idéaux sont faciles à théoriser en raison de leur nature périodique, et la compréhension de la micro-PK acquise grâce à l'étude du phénomène de formage à chaud pourrait être appliquée pour mieux comprendre l'effet de la conscience sur les systèmes biologiques.

Mots-clés : *intention humaine, parapsychologie théorique, micro-PK, macro-PK, conscience*