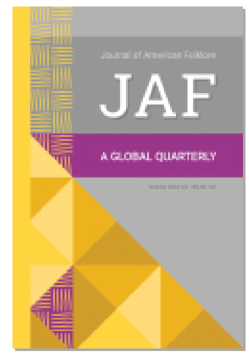
Repairing Tradition: Vernacular Knowledge, Cognitive Spaces, and Economies of Work in an Agricultural Repair Shop



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Making and remaking have long been intertwined. While there is a rich history of artisanal, craft, and industrial fabrication in folklore studies and history, histories and studies of repair have only recently begun to emerge as part of a larger effort to re-think the nature of creativity (and thus also of tradition). Dotting urban and rural landscapes around the world, repair shops occupy physical and mental spaces situated between maintaining things as they are and creating something entirely new. That is, repair is not just a matter of re-creating an object; rather, it is the product of an engagement with not only the object itself but also the environment in which it is found. Repair draws to it both simple fixes that re-integrate an artifact as well as more complex forms of disintegration and integration of seemingly disparate parts that lead to novel combinations and utility. Drawing on extensive ethnographic observation of a repair shop in the Louisiana prairies, the current study seeks to understand repair as a complex socio-technical system, a negotiation of the world as it is with the world as it should be.

Keywords:
(from the AFS Ethnographic Thesaurus), repairing, cognition, epistemology, traditional knowledge, common sense, pattern making, metalworking

The art historian Kenneth Clark once described the English language as generous when it came to making distinctions ([1956] 1972), but I would argue it is equally generous in its confusions. In particular, the word *repair* readily conjures everything from simple fixes of broken things to improvements of extant artifacts (and systems). At one end of the spectrum, to repair something is simply to bring it back to its nominal, original condition. In the current moment, when so many goods are either disposable or require authorized repair facilities, this is for many of us what happens when we bring our cars to the repair shop or our phones to a business that replaces the screen. This is captured in the alternate word, *fix*, which can also suggest the prevention of things getting worse, as in "she fixed the table by folding a piece of

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the menu to stop the wobbling." *Fix*, in this sense, falls short of *repair*, which would undertake to level the table's feet so that it doesn't need a wedge.

Also adjacent to repair is *tinkering*, which often describes someone who engages in interesting experiments, but those designs are often more curiosities, idiosyncratic in nature and failing to become part of a larger tradition.[1] This is not to say that in repair, as in innovation, there isn't a certain amount of tinkering: both require creative thinking and the mechanisms of tinkering, the disintegration and integration of seemingly disparate parts, often lead to combinations that are useful, as Douglas Harper captures in his account of a small shop in northern New York (1987). Some might be tempted, like Harper, to consider this work as bricolage, making use of what Lévi-Strauss termed *bricoles*, odds and ends, the leftovers, often of industrial modernity itself (Lévi-Strauss 1966), but I would argue that making use of available materials because they are part of an imagined integration and making do with those materials because there is nothing else available are two very different projects. The kind of work being examined here is not limited to "making do." Rather, it is about what needs to be done: limitations on (or to) repair are internal to the system, a matter between shops and their customers, and not an external limitation of resources or access to equipment or know-how.

Repair here will be treated as something large, deep. It is the product of an engagement with not only the object itself but the environment in which it is found. While repair is manifested in an artifact, what lies behind that repair is a complex network of mentifacts, some of which draw upon traditions, some of which draw upon idiosyncratic factors, and some of which are bound by historical necessities. By zooming in and out on various aspects of repair as process and product, we can explore the hermeneutical complexity of repair. In many cases, that complexity requires specialists, and thus repair shops and services continue to dot modern landscapes, despite the best efforts of many industries to lock them out.[2] In short, repair is a product of a complex socio-technical system, a negotiation of the world as it is with the world as it should be, but these complexities are readily lost in the noisy spaces within which repair takes place, with dialogues between people, between people and materials, and even between materials all competing for attention and understanding.

Repair is better understood as a nexus. It draws to it both simple fixes that re-integrate an artifact, tinkering and hacks that explore the boundaries of both disintegration and integration, and modifications that represent localization of artifacts to customary use within a given tradition of practice. Always already situated in larger economies and polities, repair also draws together matters of power, agency, and social order. Finally, repair opens the door for folklorists to examine with some precision what must remain the same and what can be allowed to change—the tension between tradition and innovation that individuals negotiate, and instantiate, every day.

Situated between keeping things as they are, maintenance (a task we already know is not an easy or passive one), and creating something entirely new (a task already much studied, especially in the moment of late capitalism), repair offers a prism into the cognitive processes that lie behind traditionalization, authenticity, and authorization. As both the old philological project of collection and the new philological project of ethnographic studies of cultural practices have established, nothing can be maintained as it is. All acts of maintenance, no matter how hard they attempt to duplicate what has come before, are also acts of creation. This dynamic pairing of creation and re-creation are what this essay seeks to bring to repair. The changing nature of stories, the ephemeral nature of memories, and the constant friction of the natural world are the foundation of our work. The changes in stories as they travel across time and landscapes both physical and virtual remain central to our studies. Those landscapes have long been full of a myriad of objects interacting not only with the landscape itself but also with each other. Those objects wear down, require repair, and sometimes in the process are made better through repair.

Repair shops, then, are physical, social, and cognitive spaces where tradition and modernity intersect almost prismatically. What better locus for an investigation into creation and re-creation than the places where such work occurs? To answer that question in advance: repair is a particular kind of work, one which involves an ability to hold simultaneously in the mind both the intended purpose of an object as well as its actual use. Such moments of imagination are a daily occurrence in agricultural and industrial repair shops all around the world: They occur whenever a farmer brings in a piece of equipment, sometimes so bent as to be unrecognizable, and asks that it be straightened and, perhaps, strengthened, made not only as good as new but perhaps better than new. Even if such a request is not made, it is often the intention of the repairer as they take up a torch and cut away what cannot be fixed and rebuild with an eye not only to the intended use of the piece of gear, but to how it actually is used.[3] As I hope to make clear with the numbers and diagrams traced onto pieces of metal or slabs of concrete, there is even a language for describing the nature of the work, if not exactly the work itself.

The study is situated in south Louisiana because I have spent so much time there, and I know the shops so well.[4] But I have found similar landscapes dotted with shops across the United States, and I have spied them while traveling through Ireland, England, France, the Netherlands, and China. Many of these landscapes were a mixture of both the rural and the industrial, and whether the landscape is one of roads, rivers, prairies, or deltas, fabrication and repair shops can be found interspersed among other structures, if one is but willing to see them. Their focuses may vary, but their orientations are remarkably similar. In south Louisiana, for example, the shops found along the highways and bayous that lead to the Gulf of Mexico tend to focus on the oil industry and its needs, while those shops found among the fields of rice and soybeans are usually oriented toward the needs of farmers.

In one such shop, where I had spent a great deal of time trying to understand the nature and history of the crawfish boat, I realized that in addition to the fabrication work that regularly came through, there was also repair, and all too often repair and fabrication were intertwined: grain carts were not simply brought in to be repaired, but to be *rebuilt, remade*. The work consisted not only of cutting out or off the old but also welding and bolting in and on the new. In many cases, what was new differed significantly from the cart's original design. This disintegrative-integrative thinking seemed to me one way to approach an epistemology of repair. What these repair workers develop is a set of cognitive strategies that allow them to exist within the interstices of a global economy focused on squeezing ever more value out of its products, locking consumption in and repair out. The focus here is on the role that individuals involved in the repair of mass-produced machines play within a larger system of ideas, practices, objects, and economies.

What follows is a profile of a particular repair shop, an examination of one of the tasks in which it engages, and then an exploration of how those tasks are imagined and thus cognitively and culturally (because the cognitions are shared) organized. With this map in mind, the essay considers opportunities for interdisciplinary dialogue between folklore studies and fields working on adjacent repair topics and even in adjacent repair locales.

A Repair Shop

Repair shops are situated at the intersection of local sociocultural networks and larger, often global, supply chains: they are where the rubber meets the road, the rubber breaks, and someone fixes it according to local standards of operability. No matter where a particular repair shop appears, it always occupies a space—or constitutes that space—wherein people, materials, and artifacts from across the road and across the globe move in and out in a flow that is continually tracked such that the owners and operators of the shop achieve the balance they seek—that of occupational, social, and commercial satisfaction.

Olinger Repair Service, or Olinger's—as it is more commonly called by the people who arrive at its door with broken gear in their hands or in the back of a truck—is a few miles north of Rayne, the closest sizeable town (with about 8,000 people).[5] Rayne is in a region of southern Louisiana known for the francophone cultures of Cajuns and Creoles, but the region also witnessed significant immigration by both Old World and New World Germans during the nineteenth century and then later during the oil boom of the twentieth century by, as they were called by the region's denizens, "les Americains."[6] The Olingers are descendants of the last group of Germans to arrive in Louisiana, some of whom came from the Rhineland-Palatinate, and some of whom were drawn from the Midwest.[7]

In the current moment, the agricultural workforce is tiered: at the top are farmers whose families are admixtures of Cajun, German, and other US ethnicities conventionally understood as white; in the middle are a limited number of African Americans largely working as permanent hired hands; and at the bottom are migrant laborers, most of whom are from Mexico. While there was once a more significant African American presence in the workforce, the increased mechanization of farmwork has limited the need for labor to seasonal peaks. Large tractors and combines with 30- or 40-foot headers now do the same work that once kept field crews of farming families and hired hands employed year-round, creating an environment in which groups intermingled more readily and regularly. As Henry Glassie once observed about the shift away from the open-field system in England, we usually describe such changes in terms of efficiency, but what we mean by that is economic or mechanical efficiency, not social efficacy.[8]

In addition to the layers of history and culture, the Olinger shop is also situated in the middle of an interlocking economic system that includes everything from large manufacturing conglomerates, who are themselves increasingly centralized—for example, the legendary International Harvester brand is part of Case IH, which itself merged with New Holland to form CNH Global, in which Fiat is the majority shareholder; to intellectual property regimes that increasingly shift functionality from hardware to software; to markets that determine commodity prices, and thus the success or failure of individual farmers, that are housed around the globe, and thus trading occurs around the clock; to the very highways and railways on which shipments of goods arrive and grain leaves. Indeed, shipments of steel and other manufactured parts arrive daily at the shop in the same vans and trucks that pull up to businesses and homes everywhere. These networks of production and distribution are usually overseen by at least one regulatory entity, and in almost all instances, the larger players in a given arena have more power either to set or to negotiate terms.

The shop's local surrounds are far more pastoral: on two sides are rice fields, and on the other two sides are houses belonging to family members (see fig. 1). Gerard Olinger owns the shop, and his brother Dale, who decided to join him, began working there with Gerard "until something better came along"—as both brothers frequently note—but nothing ever has (fig. 2). The two are oriented somewhat differently: Dale prefers work that is consistent, while Gerard prefers work that presents challenges. The combination allows the brothers to pass tasks back and forth so that each can do the work he prefers. This has resulted in Dale taking on regular fabrication and repair work, while Gerard focuses on the one-off repairs or the fabrication of custom tools or machines.

As owner and operator of Olinger Repair Service, Gerard is well-aware of both local and global contexts within which the shop operates. On more than one occasion, he

Figure 1. The Olinger Repair Shop (photo by John Laudun).

Figure 2. Gerard and Dale Olinger working on an augur (photo by John Laudun).

has noted in passing that some of the fabrication work the shop performs is taken on because that work is either by its nature not profitable to a larger player or a larger competitor has not discovered a way to make it profitable. Thus, if a south Louisiana farmer orders a side plow for his new John Deere tractor, the tractor first goes to the Olinger shop to be outfitted, and then it is delivered to the customer. Smaller players like Olinger create what spaces they can, seizing upon their knowledge of local practices and traditions to the best of their ability.

In addition to the combines and tractors coming in for refitting, there also arrive a whole host of other machines and tools, including crawfish boats, which have made a singular contribution to the region's agricultural economy[9] (see fig. 3). The delivery

Figure 3. A typical collection of artifacts lined up outside the Olinger Repair Shop awaiting attention. From left to right: a crawfish boat, two PTO ditchers, a tire rotary shredder (on trailer), a cultivator, a rice truck, and an antique Case harvester (photo by John Laudun).

trucks that pull up outside the shop drop off replacement parts or raw materials for the making of replacement parts or, in some cases, entirely new kinds of parts. The manufactured pieces that arrive include hydraulic rams, bearings, chains, and occasionally small engines for the crawfish boats. The shop also keeps a supply of various steel and aluminum stock on hand: rods, sheets, bars, angles, channels, and tubing as well as nuts and bolts of all shapes and sizes. If a repair is to be effected quickly, then the materials need to be at hand.

And repairs need to be effected quickly. While some farmers bring in equipment ahead of its season of use, or just after a season of use, most farmers put away gear at the end of a season with the intention of attending to a particular wobble or a peculiar grinding noise when they have the time, but farming has a way of always filling the available hours, and then it is time again for that piece of equipment to be put to use cultivating a field, pulling up (or down) a levee, or harvesting a crop. And it breaks with rain in the forecast or rice standing in the field and needs to be repaired right away. It is in this moment of things needing to be repaired that the Olingers dwell for much of their time in the shop: almost everyone who walks in wants their job to be done before all of the other jobs.

Few repairs are as simple as bending something back into position and welding an assembly back together. To be clear, even welding is not as simple as it sounds, for in many cases, the welds that come from a factory may not be entirely suited to usage, perhaps in general, but especially in particular cases. That is, welding is not a one-size-fits-all practice, and in many cases, those doing the welding on factory lines are doing so to specifications created by engineers, especially if the welds are by machines, and those engineers' sense of what constitutes an appropriate amount of weld is based on algorithms and/or specifications that are far away from the moment where a cultivator is hydraulically lowered into a field and then dragged at speed and subjected to the vagaries of soil makeup, moisture, and a farmer's mood.

Gerard Olinger regularly shakes his head over failed welds that arrive in his shop, apprehending them as necessary failures, the result of designers and then factory workers not necessarily understanding the actual dynamics of a machine's operation: they have misapprehended, and thus not properly anticipated, the forces at work on a particular part or assembly. While the dangers of too little of a weld are obvious because structures break when they do not cohere as they should, with too much of a weld, a part or assembly cannot flex the way it needs to under a load: making structures too rigid equally leads to fragility. Coherency in machines is understood as dynamic, always in relationship to other factors. Incoherency can be as much a function of too much rigidity as too little adherence.

In some cases, farmers have made things worse by adding on additional welds as they noticed parts beginning to fail. By the time a machine makes its way into the Olinger shop, it is often the case that forces that would have resulted in a minor break have been so pent-up by so many layers of amateur welds that the break is significant: not only have welds broken, but other pieces have broken, too, resulting in a cascade of failures, and now there is significant work to do. What follows is not only a mending of what came from the factory but a revision of the design, making it more functional by making it more stable within the maelstrom of daily farm operations.[10]

Carts

Perhaps the best example of such revision is the regular appearance of grain carts early every summer. Come June, carts stand in a line outside the shop (see fig. 4). The only thing that distinguishes them typically is their color, or what remains of it after seasons of hard use. Otherwise, each looks much like another: two large tractor wheels hold up a container that looks like an upside-down pyramid with a spout off to one side. The task of a grain cart is simple: fetch harvested grain from the combine, haul it out of a field, and dump it into a waiting truck so it can be hauled over-road either to a bin for storage or a mill for processing. The offload from the combine to the cart needs to happen anywhere the combine happens to be, and it either has to happen quickly or it has to happen while the combine continues to cut. Once harvest begins, there can be no delays: the optimum conditions for harvesting are typically only a narrow window of time. The rice or beans must be dry enough that they will store easily but not so dry that they shatter along the way.

Almost all of the carts arriving at the Olinger Repair Shop are not doing so for simple repair work—most simple repairs are handled by farmers themselves. These carts are coming to be improved in some way. Over the past decade or more, the basic modification being done is a conversion from being powered by what are known as power take-offs (PTOs) to hydraulic motor-driven augurs. Power take-offs are exposed shafts on the back of a tractor tied to its transmission: it is a robust, mechanical way to transmit power, but also a highly dangerous one. Hydraulic ports on the back of a tractor require that more complex devices be attached, but they are also safer and allow for greater varieties of usage. That conversion itself is part of a larger "hydraulification" of carts, wherein the cart's gate is transformed from a hand operation—requiring

Figure 4. A line of grain carts outside the Olinger shop (photo by John Laudun).

the driver of the tractor to get out of the cab and, often, wrestle the gate open and closed—to one where a hydraulic ram opens and closes the gate (fig. 5). In this way, the entire operation of the cart is not only made more efficient, by saving time, but it is also made safer: PTO-transfers require spinning shafts, which, if not protected, can grab a loose pants leg or shirt sleeve, resulting in serious injury. Power take-off shafts are also subject to wear in a way that closed hydraulic systems are not. Thus, a hydraulic cart has the advantage of not having dangerous moving parts, keeping the operator out of the danger zone, saving time by allowing the operator to remain in the tractor cab, and, finally, replacing a power-transfer system that is open—grit is everywhere—to one that is closed and thus more durable and dependable.

The carts arrive just as the heat and humidity of Louisiana summers begin to build, and with the change in the weather also comes the hint of resignation that tinges announcements in the shop that it is time to get to work. The farmers gathered around the coffeepot in the corner of the shop glance out the open door and calculate the day's eventual high based on how much haze hangs in the air or how much humidity already presses on their skin. Gerard Olinger tops off his coffee mug, snaps on its cover, and walks to the corner of the shop where the day's work will take place.

The first step is to bring a grain cart into the shop. Getting the cart inside is important for a number of reasons, despite how difficult it is to maneuver a cart into the shop through even the largest of doors. First, all of the tools Olinger will need are in the shop, and, just as important, they are already arrayed around his workspace in a way that makes getting to them convenient. That convenience of things "ready to hand" means he can stay focused on the work. Second, not all the tools he needs

Figure 5. A grain cart showing off a complete transformation into being fully hydraulically, and thus remotely, controlled: note the collection of hydraulic lines at the front of the cart (lower left) and a horizontal ram operating the gate inside the hopper as well as the new, enlarged, and hinged augur, folded down for road travel. When the housing folds close, the upper augur sockets into and is powered by the lower augur (photo by John Laudun).

are portable. Both the acetylene torch that will be used to cut away portions of the cart and the arc welder that will be used to attach the new features are not easily moved—nor can the arc welder be in the rain, and the most important tool, a wheeled A-frame lift, cannot be taken out of the shop at all: its wheels would quickly mire in the gravel of the drive. Third, the breezes that sometimes make the prairies bearable in the summer can wreak havoc on welding, dispersing the tight cone of inert gas, weakening or destroying the work. Should a breeze arise, the shop doors are usually dropped down to block it out. Fourth, the interior of the shop gives the men inside some relief from the relentless sun and the occasional rain.[11]

With the cart inside, the next step is to remove a wheel so that the cart can be lifted onto its opposite side to give a man room to work underneath. There is a great deal of cutting and welding and fitting and grinding to be done with a lot of heavy pieces, and doing it on your back or knees is cruel. So, the cart is asked to kneel a bit. With the tire off and the hub safely settled onto a block of wood to keep its hardened steel edges from gouging the concrete floor of the shop, the A-frame lift is moved over the remaining tire, and chains are wrapped around the axle. As several tons of cart are slowly lifted between 4 and 6 feet into the air, everyone keeps an eye on the lift, which is allowed to roll around on the shop floor, rediscovering its center of gravity as the cart itself arcs away from it. Novices in the shop are tempted to stop its lunging dance but are warned away by the story of the time Gerard's father did not consider seriously enough the consequences of not allowing an object to find its center of gravity: the A-frame fell on top of him and broke his back. Such a story regularly produces newfound respect for the herky-jerky movements of the lift as its electric winch whines the side of a cart upward (see fig. 6).

Figure 6. A grain cart inside the north-facing door of the east end of the repair shop (photo by John Laudun).

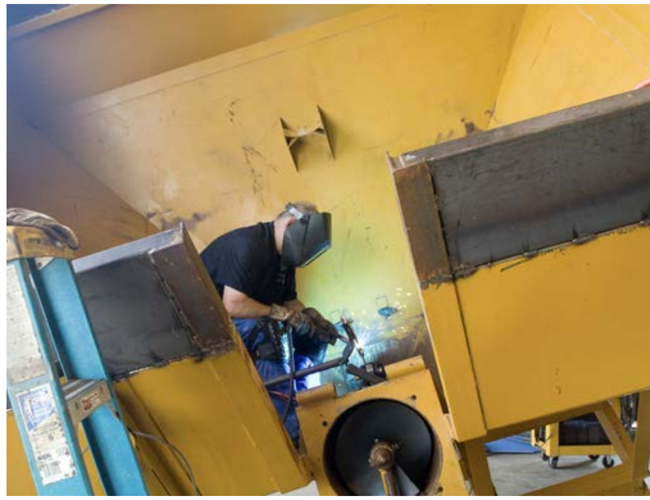

Figure 7. Gerard Olinger welding inside a grain cart. Note the extended top of the cart revealed by the new steel in the foreground (photo by John Laudun).

With the cart up, the cutting begins. How much of a conversion is happening determines how much will need to be removed. Installing a hydraulic gate is the simplest conversion and requires the least cutting, but farmers in the last few years have become increasingly interested in a fuller conversion: replacement of the gate and of the augur, which means removing the bottom of the cart's grain bin completely. The amount of cutting involved and the number of surfaces and angles involved require Gerard Olinger to spend a lot of time with the acetylene torch in his hand, alternating cutting on various pieces of metal and then hammering on those pieces, which, because they are so rusted, often resist the torch. The work requires getting inside the cart, where he is surrounded by four steel walls that are drawing heat out of the air and then seemingly radiating that heat in a very focused way toward him[12] (see fig. 7).

With the bottom of the cart's bin cut out, it's time for Gerard Olinger to determine what to build back. While he has done dozens and dozens of these modifications over the years, and he has a variety of templates both mental and physical lying about, each cart is different. It would be easy for a casual observer to be fooled into perceiving that modifying a grain cart, or installing a side plow, is an easy affair: all you need to do is bolt and weld some things and you're done. It would be especially easy to be lulled into such a perception after having watched Dale Olinger install the tenth side plow of the season or having watched Gerard Olinger modify the sixth grain cart. Surely, working on a standardized part like a tractor or cart must itself be a standardized process. A John Deere is a John Deere is a John Deere.

From Physical Geometries to Socio-technical Spaces

And yet a John Deere isn't. John Deere tractors vary from model to model, and model lines often change from year to year. Hydraulic lines that have to be avoided are here on this model this year where they weren't last year. An irksome battery box is no longer there, but it has been replaced by a modified exhaust stack. The rear axle, to which a side plow mounts, now has an offset. And none of this includes the individual tweaks and modifications that each farmer makes in adjusting the width of their tractor's carriage or running tires of different diameters (see fig. 8).

A quick look ignores, too, the complex three-dimensional geometry required to "float" a plow just ahead of the rear tire, intersecting the thrust vector of the tractor at just the right angle that it anticipates the rear wheel and throws the soil clear of the path. The problem lies in the physics involved. First, there is not much space between front and rear wheels, a space within which the side plow must be able to be both raised and lowered. Second, as it is lowered and pushes into the earth, the plow wants to dig. Were it allowed to do so, it would lever the tractor up into the air following the arc of its own axis. Third, the plow resists digging, and levering up, by concentrating all its forces in a strictly backward horizontal motion, a force that must be shouldered by an assembly of thick iron tubing and bars either jointed to move or welded to stay fixed and bolted to the body of the tractor in three different places. The same kind of complex geometry applies to the bottom of grain carts, where irregular polygons converge to clasp the regular cylinder of the grain augur, which is itself tilted at somewhere between 45 and 35 degrees from the vertical (see fig. 9).

In order for everything to fit together, no mean feat in and of itself, as well as work, I have seen both men perform a variety of mathematical calculations in their heads. Sometimes, when there are enough numbers of sufficient complexity, they make notes on various surfaces: the steel on which they are working, a worktable, or the shop's concrete floor (see fig. 10). These numbers in conjunction with detailed verbal descriptions and a set of hand gestures allow the two men to communicate with each other as well as with knowledgeable others about what needs to get done, in what

Figure 8. A newly installed side plow by Dale Olinger (photo by John Laudun).

Figure 9. An overhead view of a side plow highlights the tight geometries that must be negotiated to situate the plow to maximize its effectiveness and to accommodate the forces that push back against it as it pushes forward (photo by John Laudun).

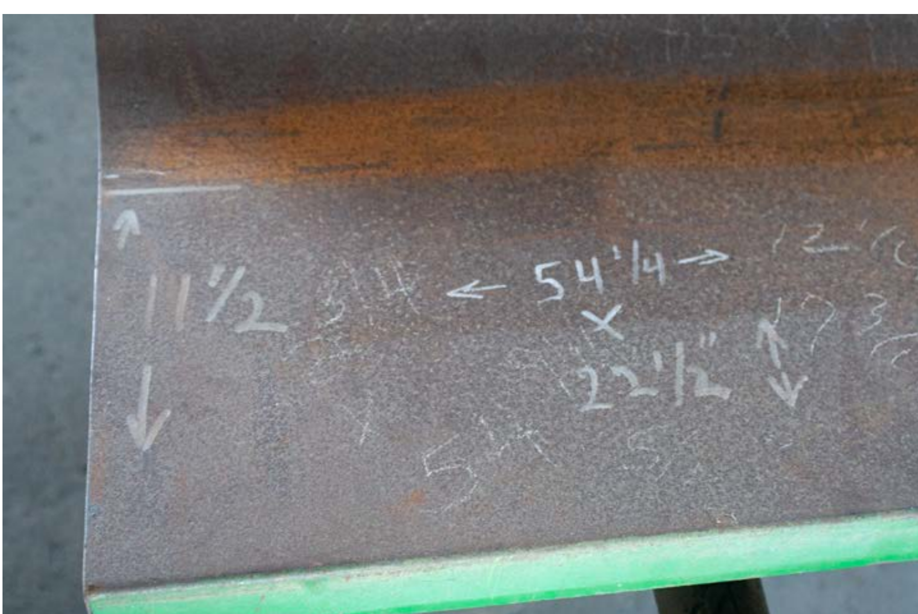

Figure 10. A piece of steel covered in numbers that both describe it as well as dictate the actions to be performed, and where to perform them (photo by John Laudun).

order it is to be done, and how to do it. There can be no good weld without a surface first being ground clean, no lasting bolt without the right torque, and nothing without good measurement—and every measurement depends upon knowing what the exact tolerance framework is (how much you are allowed to be in error).

All of this mental work appears to get done either in passing or in conversation, and so it is easy to look past it, caught up as we can be in the flashy spark of welding or put off by the clanging of hammers on metal. Much of the work appears to get done quickly, apparently taking far less effort than lifting a plow into place, but it's often the case that the work is proceeding apace inside the heads of the people who populate these shops. To confirm this, all you need to do is to try to interrupt them while they are doing a seemingly simple task or while they appear to be taking a break: the pause you encounter is them saving their work.[13]

The speed and ease of the work leads to an apparent label: intuitive. Fortunately, starting in the 1970s with the work of Hubert and Stuart Dreyfus, who studied both commercial airline pilots and chess grandmasters at work, intuition has been denaturalized: where we once attributed intuition to some innate ability, it is now understood to be a function of expertise. The Dreyfuses developed a model that outlines five stages in the development of such expertise, wherein an individual moves from novice to expert not by simply knowing more but by accumulating and refining so-called *rules of thumb* (usually through experience) (Dreyfus and Dreyfus 1986). That is, experts use different models of the world than novices use, and those models are based not simply on design patterns but on patterns of experience that are steeped in the design and its interactions with the world. Patterns of experience might be something cognitive scientists would say are, or lead to, prototypes. Folklorists might describe these patterns as competence drawn from multiple performances. The evidence for this expertise can be found in the soapstone numbers flashed onto a workpiece, or a portion of a workspace. It is a bridging of the visible handwork with the invisible expertise, or intuition, of the individuals involved, an integration of the ontologies being addressed, connected, and worked.

The complexity of maintaining this mental space within the material space of a shop is a function of the simple fact that, at any given time, the Olingers are not simply working on one job. Almost any large job at the shop is interrupted by any number of smaller jobs or tasks. Someone comes in with a hydraulic hose that needs replacing, or they need a new bushing, or maybe they need a quick fix for a piece of gear they are in the middle of using. Just as important as these urgent tasks are customers who come in and need to discuss a problem or potential job. Each person who enters the shop requires one of the two men to put down what he is doing and, perhaps more importantly, to move outside the mental space in which he was working. Where they are in a particular task has to be saved or committed to memory in some fashion. It's not unusual for someone coming into the shop to have to wait 5 to 15 minutes while Gerard or Dale reaches a point where he can stop. Getting to a "stopping point"—a common phrase in such work—is not really a physical process but a mental one: a stopping point is an easily remembered place where one leaves a task, such that taking up the task again does not require a great deal of time or effort. Tools and parts are arranged in a particular way so that not too much time is required to "pick up where you left off."

Like other shops I have observed, the structure of these workspaces within the large building that is the center, or central space, of the business is not necessarily clear to the eye. There are storage areas both for stock and parts of various kinds as well as for tools. Like most shops that feature fabrication as part of their services, there are also large tools that are fixed in place and require a certain amount of working space: a hydraulic press, an ironworker, a mill, a lathe, a press brake, a roller, a drill press, a shear. There are also acetylene torches and welding rigs that are somewhat mobile but usually used in semi-dedicated spaces—and most busy shops have at least two welding rigs, one for steel and one for aluminum, in order to reduce time spent switching out wire. At the Olinger repair shop, both men have heavy-duty tables that often anchor a workspace, though most of the tasks they perform in service of a job will not fit on a table, and so a workspace is really an area of open floor space into which a job is brought to begin, and out of which it will move upon completion (see fig. 11).

Since anyone working in the shop usually juggles several jobs, there are typically multiple workspaces for each individual, each with its own saved place or stopping point. Sometimes multiple workspaces are the result of a job being located closer to a given piece of equipment. A lot of the hydraulic work, for example, happens in a covered area behind the shop because a vise and a number of tools for dealing with recalcitrant rams, as well as a parts cleaning station, are located there. Sometimes multiple workspaces are the result of a piece of equipment being too large to come

Figure 11. A reverse view of the shop from the previous one with the cart in it, this time with a lot of jobs in process, demonstrating how workspaces are managed (photo by John Laudun).

inside the shop, or too dirty, although as the discussion of the work on grain carts should make clear, it is rare for a piece of equipment to be too large: combines, without their headers, can make their way through any of the three bay doors.

On most occasions, only the two bays opposite each other at the east end of the building open onto workspaces: the bay door situated in the middle of the northern façade is usually reserved for materials to be moved in and out of the shop, and the equipment used to work with larger pieces, like the press brake and the shear, are located closer to this middle, and thus also in the general space. Customers and service people less familiar with the shop will go through the human-sized front door on the west end of the northern façade, but those more familiar will enter through this large bay door, which is usually open, even when the other doors have been dropped when welding on windy days. Because this area is generally kept clear, it is well-lit and also typically free of anything possibly dangerous to the visitor.

These physical spaces, then, are housing for mental workspaces, shells within which multiple cognitive bubbles exist. Objectively, the men move about the shop, but subjectively, they are moving from one job to another or leaving a workspace in order to fetch a tool or a part in order to return to that workspace. If interrupted and unable to save their place, or store the bubble as it were, they know that returning to the work will take more time as they reconstruct what they were doing, sometimes standing in place and mentally tallying the steps that they think, hope, that they have already taken, slowly approaching the point where they stopped. Sometimes you can see the moment when the bubble has been reconstructed: there is a change in posture, a slight lean forward as the body prepares to "shift into gear." The importance of this cognitive step cannot be overstated. Because so much is always going on in a shop, individuals within it have to find ways to track current projects, which sometimes occupy convergent spaces themselves. Without this ability to "change tracks" or "switch gears," the flow of work in the shop would grind to a halt.

Just as important as the two men's ability to juggle tasks and manage people is the ability of customers to wait. Sometimes that waiting is sociable, with the Olingers engaging them in conversation; sometimes the waiting is simply standing there, "waiting your turn." And sometimes the waiting requires you to hold something so that it can be clamped or tacked in place: there are no signs in the shop that require customers to stand outside of working areas. Thus, the Olinger shop, like most, is porous both socially and technically: work happens in a lot of places and with a variety of people. While a wandering customer is not as likely to be asked to help out as they are to be asked what help they need, it can and does happen. And thanks to overlapping competences, due to agricultural shop classes in area high schools and the informal apprenticeships that most serve as younger men and as sons on family farms—and we are dealing mostly with men—there is an expectation that if you are asked for a vise grip or to hold the end of a bar, you will be able to do so. In the case of more complex or more obscure tasks, you will be shown what to do. Not "lending a hand" is not an option.

Charles Frakes describes a similar diffusion of competence across a group of individuals collaborating variously in the accomplishment of a task in his examination of navigation by Medieval and Micronesian sailors. Frakes documents a variety of devices, like the compass rose, that embed cognition within them, and that knowledgeable individuals could use to "record and process vast quantities of ever-changing information" (1985:256). What is important about the compass rose, he points out, is not its mechanics but that it offers up an abstract model, a cognitive schema that the entire group uses and through which the group interacts. The notion of a workspace is something similar and not unlike a combination of the compass rose and the "body bubble" from proxemics: having hailed one of the two men, visitors approach a workspace, but will typically stand 8 to 10 feet away. Having been acknowledged, visitors recognize that they need to wait until a task has reached a saving point. They stand and wait patiently, sometimes offering up conversation (which may or may not be returned) until a moment when the current work has been saved, which is often signaled by the person doing the work turning to face them and making eye contact. Visitors who do not understand this protocol, or who break it, may receive the attention they desire but not necessarily as a priority in the queue—often they are placed lower in the queue for being presumptive.

This kind of complex socio-technical system was explored by Edwin Hutchins in his examination of modern sailors navigating and helming a large ship. He notes that all too often in our focus on one aspect of a larger system, we mistake the smaller piece for the whole, which in turn "creates the impression that individual minds operate in isolation and encourages us to mistake the properties of complex sociocultural systems for the properties of individual minds" (1995:355). Having spent time in a dozen or more repair and fabrication shops—some of which were one-man affairs, some two, and some with more elaborate hierarchies of owner-managers and employees—I can attest that the workspace as both an arena within which work is done through a variety of cognitive schema and a place across which work and social relations are negotiated, is present in shops, equipment sheds, and out in the fields. If you have driven past a group of workers standing around a piece of machinery, and only one or two appear to be bent to the task and the others are standing at a remove, perhaps chatting among themselves, then you have perhaps witnessed a workspace in action.

Part of the difficulty in understanding the nature of repair in particular and the nature of such work in general is the dirtiness, both literal and figurative, of the space(s) it occupies: these spaces are usually quite crowded with things and people, sometimes in an order that is not apparent. Repair is especially prone to the accumulation of a wide variety of objects because there is also a factor of unpredictability in the practice of repair: "one never knows" what might next come through the shop door. Shops are often littered with pieces of metal that have been cut off, beads of slag from cutting, metal filings from grinders, as well as a wide variety of dust, dirt, mud, grease, and assorted debris that accumulates on machinery and comes along for the ride. (The smell of rotting crawfish or the various kinds of bait, dead fish, or extruded whatever can be especially redolent during crawfish boat repair season in agricultural repair shops in south Louisiana.) There is also the noise that comes from cutting, grinding, and sometimes hammering on something to make it come off. The work also happens, typically, in enclosed but unconditioned spaces, so any and all noises echo around metal buildings designed to keep the worst of the elements out but not the heat or the cold.

It is no wonder then that the people who work inside such spaces have fairly robust cognitive schemas with which to do the work. Because the socio-physical space by its nature is prone to chaos, a techno-cognitive space is overlaid such that work can be organized both with regard to the task at hand, the tasks that lie ahead in adjacent workspaces, and the people with which one finds oneself surrounded and who may or may not intrude into one's workspace(s). Accommodating such intrusions is, it would seem, a historical fact of life for shop workers: George Ewart Evans once noted about shops he experienced in the late nineteenth and early twentieth centuries that "the smithy was a natural place for men to congregate" (1969:138). The press of people, especially on those mornings when the weather drives farmers out of the fields, can often be so great that one afternoon, when someone observed to Dale Olinger that the clock above his workstation had stopped at a little after eight in the morning, he replied: "Oh, that clock tracks how much work has gotten done."

Vernacular Epistemologies

Repair focuses our attention on the essentials: everything wears. Sometimes the wear is direct and dramatic, like a tire suddenly blowing out or a bridge collapsing, but more often, the wear is indirect and incremental: it happens one small bit at a time, accumulating until the change crosses a threshold, bringing it to our attention, like all the small pieces of rubber a tire loses every time we drive, or the bits of dust that get trapped in a joint and grind away at the metal until it gives way. It is usually the small moments that build to a larger moment of breakage, which are punctuated by bangs or, worse, sudden silence. As Steven Jackson notes: "The world is always breaking; it's in its nature to break. That breaking is generative and productive" (2014:223).

Jackson's observation leads him to wonder if it is possible to imagine an *epistemology of repair*, and, if it is, what would the implications for such an epistemology be for our understanding not only of knowledge itself but the role it plays in the world as we actually experience it? A focus on repair offers a balance, a counterpoint, to the focus of so many histories of technology that highlight innovation, enjoying both the romantic appeal of the genius and the corporate appeal of novelty that leads to competitive advantage. Against this backdrop of constant documentation, both out of fascination and the need to make substantiable intellectual property claims, what hope is there for the grubbier, grimier scenes of repair?[14] Repair is what people who can't afford to replace resort to. Repair is the lesser trade: those who can't build, fix. Like a shovelful of asphalt pitched into a pothole, repair only comes when the built fails.

Recognizing the historiographical bias of history to focus on change over apparent constants, historians of technology have begun to offer modifications, or repairs, to the discipline, a number of which draw upon sociology. In a recent discussion of *maintenance* in historiography, Andrew Russell and Lee Vinsel characterize the orientation as "history is the study of change over time, so one might argue that the study of *not-change* over time is outside the definition of what historians do" (2018:4; emphasis added). The awkwardness of *not-change* is purposeful, one hopes, revealing a lack of awareness that there is in fact an adjacent field like folklore studies that addresses not-change, or at least the consistent efforts of humans to defeat change even in the face of its inevitability.

Terming the lack of change as invisible, a number of studies have framed repair as part of the larger process of articulation, which sociologist Anselm Strauss first defined as work associated with coordination and integration (1985). Studies of the "hidden dimensions" of socio-technical systems have included the service work of domestic staff and the maintenance work of linemen and the work of nurses (Pallesen and Jacobsen 2018; Star and Strauss 1999; Dupret 2017), all of which feature work that, when done well, goes unnoticed. In revealing the failing of larger systems to accommodate local needs, articulation highlights the often-emergent nature of repair: what performers of the work often do to keep things running is either create workarounds for inappropriate designs, correct those designs, or ditch the proffered solutions altogether and arrive at local(ized) solutions that fit the people and the task(s) more precisely and accurately.[15]

Unlike factory work, where the labor has been rationalized by tiers of managers and consultants, the repair and fabrication work embarked upon in a repair shop is sometimes narrowly specialized per task. In a shop like Olinger's, for example, repairing *that* size augur with *that* kind of shaft with *that* particular wear pattern will take *this* amount of time. This ability to recognize the nature of the work is a function of having done it before, and the more you have done enough work of sufficient variance in nature and scope, the more precise the recognition of what the current task is. Such recognition is patterned, and perhaps even rule-based, but nowhere are those rules written down. And while one could imagine such a rule book being written, its utility outside a given locality would be limited: as most of the individuals who own repair and fabrication shops will tell you, different soils and different crops result in different usages and thus different wearing and breaking. Moreover, asking for rules runs counter to the kinds of expertise you experience in repair. As Hubert Dreyfus notes, "if you get an expert to give you his rules, you're forcing him to regress to a beginner where he had rules. You're not getting his expertise; you're exactly getting his non-expertise" (Dreyfus in an interview with Jeffrey Mishlove).[16] What actually happens in expertise, Dreyfus and Dreyfus argue, is pattern recognition, a dimension of human cognition that perhaps relies a bit on the kind of analytic rationalism cognitivists are so keen on, but also escapes it by pulling diverse elements together, perhaps in idiosyncratic ways that encourage us to label it as intuition (Dreyfus and Dreyfus 1986:88–9).

This model of expertise depends upon a rich set of examples, of priors, upon which the practitioner can draw. Folklorists might label this "tradition," in which not only personal experience matters but also the experience of others handed down through cautions and cautionary tales, as well as observation of appropriate and inappropriate solutions to problems. Dreyfus, in fact, compares the mental operations he understands as intuition with those that inform narrative.[17] Steven Jackson describes this process as "building connections [and] sorting out ontologies on the fly" (2014:223).

This conception of repair work would seem to contrast rather strongly with repair spaces that are, in the case of the Olinger shop, filled with bangs, grinds, and buzzes, as well as human voices shouting directions or wondering when lunch is. Machine shops are dark places, dirty and greasy places, loud and dangerous places. But they are dark because the spark of the weld needs careful nurturing, and they are dirty because they are filled with the sloughed skins of the machines that make our skins possible, machines that grow the food we eat. Food must go into our mouths in order for words to come out, and this is no mean feat when faced with not only complex natural ecologies but also complex cultural ecologies and global economies. The individuals who populate these spaces do so through a variety of cognitive schema that allow physical, mental, and social work to be done, sometimes simultaneously. Brandon Barker has suggested that we might be better-off considering these schema to be *vernacular epistemologies*, and I think, given the environmental complexities sketched out here, he is right (Brandon Barker, email to author, December 13, 2022).

A vernacular epistemology would, for example, be able to explain the relationship between ideas, individuals, and social networks that regularly feature in repair and fabrication work. In a prior publication, I attempted to sketch out a model of folklore as a "networked economy" where differentiated networks of ideas, people, and materials are always in a dynamic relationship to each other (Laudun 2019). For example, when I once asked Gerard Olinger about a particular feature on a PTO-ditcher that I had not noticed before, he described it as a "Jimmy hole." Why Jimmy? Because a particular farmer, whose nickname was Jimmy had asked for it, and then when other farmers had seen it, they wanted it included or added to their ditchers, "a hole like you made for Jimmy." Thus the "Jimmy hole" was born, a feature within a socio-technical system, or a social world, as Strauss once described it (1985), which was both an articulation of a possible technical problem but only really conceived as such once a larger network of individuals had observed and accepted it and made it into a social solution. A vernacular epistemology might also offer us a chance to explore the relationship between maintenance, where repair is a retrospective interpretation of the artifact as it was constructed (a kind of consideration), and repair as a prospective consideration of the artifact's actual use, which thus leans into the realm of modification. None of this exists outside of any given socio-technical system, which is both the small world of the shop itself and its various denizens, the workers, regulars, and occasional customers, as well as the larger network of shops and denizens that would have to be mapped with, one hopes, articulable boundaries.

There is considerable work to be done here, and many more vernacular forms could be brought to bear in a larger dialogue with fields that work adjacent to folklore studies. It is clear, however, that these questions are evergreen, if only because humans are the kinds of beings they are, and the resistance of systems populated by humans to being mapped as one kind of a thing or another is quite remarkable. Clearly, as more disciplines become aware of the nature of *not-change*, as Russell and Vinsel (2018) term it, there will be time and space for exchanges of ideas, concepts, and data.

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Notes

1. Perhaps the best example of someone working at the edge of tradition is captured by Michael Owen Jones' account of Chester Cornett, who used chairmaking as a way to work through a number of personal issues (Jones 1989).

2. Prior to industrialization, and in those economies (or segments of economies) less affected by industrialization, it would not have been (or is not) uncommon to take an item to be repaired back to its maker. Where local efforts at repair are stymied, there has been an increasing interest in the *right to repair*, which is founded on the idea that ownership includes the ability to dis-assemble and re-assemble a tool or machine in a way that works best for you. (Thorin Klosowski has a good overview in "What You Should Know about Right to Repair" [2021].) With software becoming so integral to so many once entirely mechanical machines, one of the central battles in the *right to repair* is the right to access and modify the code on the computers that either run or enhance the functionality of many of the machines that are essential to the contemporary world. Nowhere is the advocacy for the right to repair stronger than among farmers, and it is no accident that efforts to legalize the right to repair have progressed mostly in those states where agriculture is a large portion of the economy.

3. This dynamic itself is not new. George Sturt observes the following about the nature of repair work in a wheelwright's shop:

> From repairs, in fact, came the teaching which kept the wheelwrights' art strongly alive. A lad might learn from older workmen all about the tradition all that antiquity had to teach—but at repairs he found out what was needful for the current day; what this road required, and that hill; what would satisfy Farmer So-and-So's temper, or suit his pocket; what the farmer's carter favored or his team wanted. While "new-work" was largely controlled by proven theories and by well-tried fashions, on the other hand repairs called for ingenuity, adaptiveness, readiness to make shift. It wasn't quite enough to know how to do this or that; you needed also to know something about why, and to be ready to think of alternative dodges for improvising a temporary effect, if for any reason the time-honored methods known to an apprentice could not be adopted. (Sturt [1923] 1963:176)

4. The current study is a by-product of over a decade (2007–2019) spent studying fabricators and farmers while they worked in shops, in equipment sheds, under makeshift shelters, and out in the elements while trying to understand the imagination, both personal and cultural, that eventuated in the crawfish boat (Laudun 2016). A native, amphibious vehicle, the crawfish boat is a clear articulation of deep-seated views about the landscape upon which the boat operates, one in which fields are regularly being flooded to grow rice or drained to raise cattle: it is, in other words, an emblem of the active imagination that restlessly flits over the land, seeking to make the most use of, as farmers will assure you, little topsoil.

5. My research on crawfish boats began shortly after the 2005 hurricanes. I first encountered the Olingers in the Summer of 2007. I continued to visit their shop, and other shops until 2019. During that time, I have acted as observer, interlocutor, transcriber when measurements were called out, errand runner when bolts were needed, and even apprentice on occasion, to cut, weld, bolt, or fabricate when called upon to do so.

6. This part of Louisiana is often carved into smaller regions known as "coves" (from the French *anse*) used to describe swaths of land stretching, typically, between rivers or bayous, or otherwise bounded in some fashion. The Olinger shop is in Robert's Cove, which is largely populated by Germans who settled the area in the late nineteenth century, displaced Catholics from the Rhineland-Palatinate, but who have intermarried with Cajun and American families so much so that while the various *heimplatzes*, or home places, are still marked, they are often surrounded by newer, more modern houses with cars that carry people to jobs in towns or the nearby city of Lafayette. For more on the development of the physio-cultural landscape, see Brasseaux (1992).

7. It is the curious historical artifact, this mixture of Germans and German Americans, that first caught cultural geographer Fred Kniffen's attention as he surveyed the Louisiana landscape: the Germans built different houses from their French neighbors. As he established, those houses were not German, but Midwestern in origin, coming down to Louisiana from Indiana, Illinois, and Iowa, which led him to label them "I-houses" (Kniffen 1936).

8. In describing the great cultural change wrought by the change in infrastructure, Glassie notes: "That cultural change led from a communal order that mixed social and economic goals . . . to an order in which profit took precedence, and the family was isolated as a unit of enterprise within a massive system based on the laws of the state and the needs of the capitalist" (Glassie 1999:303). Technological efficiencies, however, are not to be confused with innovation: one better device does not beget another, even better, device; people using such devices beget better devices based on experience and expertise. This confusion of knowledge creation with economic efficiency is slowly being eroded as our understanding of creativity develops. As a number of recent works from diverse fields have made clear, social changes play a significant role in the creation of ideas that are then realized in a technological infrastructure. (See Pisano and Shih [2009] and Fishman [1999] for the importance of knowledge communities in industrial contexts, and Rose [2004] on intelligence in adaptive workspaces.)

9. As noted previously, the crawfish boat is an amphibious vehicle that was invented and refined entirely locally, starting with readily available commercial parts like fishing boat hulls and garden tillers (from Sears!). It was steadily transformed into contemporary forms of custom hulls made from thick aluminum sheets and robust hydraulic systems powered by small-bore, high RPM (revolutions per minute) engines. Each maker, including Gerard Olinger, has their own signature approach to the fabrication of the drive unit and hull. Contrary to the intellectual property regimes that seek to fence them out of repair work, the makers of the boats have not sought, and are not interested, in patents. As one maker, Kurt Venable, noted, "you buy one of my boats because you know it's the right boat for you." Venable prides himself on a hull design based on his experience building boats. His hulls are quite rigid and withstand considerable use. But his boats aren't for everyone: some farmers prefer a boat that flexes more, offering to bend instead of breaking. Thus, the boat market is segmented by design and fabrication philosophies that are made manifest in aluminum and steel. (For more, see Laudun 2016:186–97.)

10. Time is in an omnipresent force in a repair shop. Once, when asked what the next task was, Dale Olinger sighed: "Fighting time. We are always fighting time." His response came after he had already crawled inside a combine and pulled out pieces of rusted, pitted steel that formed the machine's grain path in order to fabricate the same pieces in stainless steel. To replace them, he had to crawl back into the machine. The combine was not that old, by a farmer's calendar, but while the painted steel components might hold up reasonably well when harvesting softer grains like corn or wheat, they had been no match for the hard husks of rice kernels. This kind of repair, replacing steel with stainless steel, is a common occurrence at the shop. Stainless steel is harder and more durable, but it is also more expensive, which is why it is not featured in factory original equipment, but is regularly a part of the repairs done by equipment shops like Olinger's.

11. It should be noted, however, that even in the shade, steel conducts enough heat out of the air to make it painful to touch with ungloved hands. And so, on already hot days, everyone walks around with gloves on, a tad grateful that the sweat gives the leather a bit better grip and actually lends a small additional layer of protection should one grab a piece of too-hot metal, perhaps yielding an additional tenth of a second or so to recognize the error and let go.

12. One day, steeped in the combined heat of the day and the torch, Gerard Olinger looked up and announced, "If you go to Hell, this is what you'll be doing. There is no fire." With that noted, he flipped his visor back down and continued his work.

13. In his discussion of African American blacksmith Philip Simmons, John Vlach notes while the work of blacksmiths and iron workers, especially when from the hands of enslaved people, was often derided as "simple," it was clearly valuable enough that laws were put into place to restrict slave laborers (Vlach 1991:131ff.).

14. Jackson avoids the romanticism of Richard Sennett's *The Craftsman* (2008), where Ancient Greek potters are juxtaposed with architects hunched in front of CAD system screens, focusing his exploration of repair's implications on the kind of re-purposing of mass-produced technology that Lévi-Strauss considered *bricolage* (1966).

15. The idea that there is a space, a gap, between a socio-technical artifact's design and its actual usage is not a new one. Bruno Latour (1987) first described what we now know as *articulation* in the development of the diesel engine. Others have filled out the idea more completely. The importance of articulation in the creative process is assumed in Pisano and Shih's (2009) argument that the inability of a country like

the United States to innovate in certain industries is a direct result of no longer having manufacturing hubs containing those industries.

16. This quote is taken from a transcript from the 1987–2002 BBC series *Thinking Allowed, Conversations on the Leading Edge of Knowledge and Discovery* with Dr. Jeffrey Mishlove, in this episode interviewing Hubert Dreyfus (see https://www.intuitionnetwork.org/txt/dreyfus.htm). A fuller version of the ideas can be found in the book Dreyfus co-authored with his brother Stuart, *Mind over Machine* (Dreyfus and Dreyfus 1986).

17. E. M. Bataille, a French pioneer of the steam engine commented: "Is not invention the poetry of science? . . . All great discoveries carry with them the indelible mark of poetic thought" (quoted in Rybczynski 2000:110). The intersection of repair shops and narrative seems a rather old one. In his account of smiths in rural England, George Ewart Evans notes that smithies, like the contemporary repair shop, often become the de facto social spot for area farmers: "Many such stories were once told in the smithy—the gossip or news exchange-mart under the old community. This, it seems, was the smithy's ancient reputation; as it is reported . . . that, according to an old Nordic law, a man was not held responsible for what he said at the forge" (Evans 1966:170). Evans was referencing Kerényí (1963:74).

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