

11 Conclusion: Transfer and Transdisciplinarity in Five Themes

Five themes cut across the disciplines reviewed in this volume: individuality, intentionality, fidelity, directionality, and simultaneity. All five are characterized by the situated, sociocultural, and activity-based orientations that studies of writing transfer were originally concerned with. As they emerged for us in the course of writing this volume, these themes provide pathways for writing studies to envision new lines of inquiry, theoretical and methodological paradigms, and teaching commitments through the “untapped potential of a truly transdisciplinary approach” to transfer (Tardy, 2017, p. 187). We hope a transdisciplinary approach to transfer can reposition writing studies at the intersection of multiple transfer research strands rather than (as has typically been the case) in dialogue with limited other fields. As we wrote in our introduction, this volume considers how writing studies’ existing theoretical frames or analytic habits can limit the field’s understanding of transfer. Our five themes of transdisciplinary transfer research provide readers with entry points into new frames by synthesizing across multiple fields and foregrounding connections to the transfer of writing-related knowledge and activity.

Our five transdisciplinary themes are drawn from the vast landscape of scholarship we discussed in this book’s chapters: cognitive psychology and situated learning (65 articles, 14 books); industrial and organizational (I/O) psychology and human resources (128 articles, 10 books); sports, medical, aviation, and military education (44 articles, 6 books); literacy studies (35 articles, 26 books); second language writing (108 articles, 29 books); first-year writing (68 articles, 13 books); writ-

ing across the curriculum and in the disciplines (68 articles, 21 books); writing centers (62 articles, 7 books); and school to work (67 articles, 12 books). In this conclusion, we present each of the five themes—individuality, intentionality, fidelity, directionality, and simultaneity—and within each theme, we offer distillations and examples that show how the theme can support agendas for research and teaching in writing studies. We conclude with a look to the future of writing transfer through a framework inspired by our overall synthesis. These future frames—interdependence, ephemerality, and orientation—represent the start of the “untapped potential” for a transdisciplinary approach to transfer for writing studies.

INDIVIDUALITY

Our first transdisciplinary theme, individuality, highlights a common unit of analysis in studies of transfer: the individual. Whether researchers investigate small groups or large cohorts, they almost always look at one individual at a time. Manifestations of individuality have been developed across disciplines and include the uniqueness of identity for transfer of learning, the role of individuals’ agency in resistance and failure, the relationships between personal characteristics or dispositions and transfer, and the importance of individuals’ bodies and material conditions. Only rarely do researchers turn their attention to dyads, as in transactive memory research (Wegner, 1987; Wegner et al., 1985) or activity systems (Engstrom, 2014; Tuomi-Gröhn & Engeström, 2003). Within writing studies, a focus on collaborative talk has extended the more typical, individual-focused approaches and asked researchers to consider the co-constructed, social, and dialogic nature of students’ transfer through interaction (Nowacek et al., 2019, Winzenried et al., 2017). Therefore, as this section chronicles the ways transfer research has consolidated around individuals, it also implies the additional insights that could be gained through pair, group, or community research on transfer.

Identity

The role of identity in transfer recurs throughout this book. For instance, scholars of the school-to-work transition often argue that it is through learning the genres of the workplace that students adopt new

identities as professionals in the field. Similarly, second language writing scholars report that for multilingual writers, dimensions of their identities become salient and impact transfer in a writing classroom (Johnstone, 1996; Matsuda, 2015; Norton, 2000).

In some cases, aspects of identities operate as affordances. For instance, across the fields of nursing, social work, or public relations, school-to-work scholars report that an emerging professional identity plays a crucial role in helping students make the transition from writing for school to writing successfully for work (Dias et al., 1999; Dias & Paré, 2000). In other cases, identity aspects operate as constraints. Wardle and Mercer Clement (2016), for example, analyze the ways in which Nicolette elects to “bracke[t] the experiences and values she was exposed to at home” (p. 174) rather than “speaking to her own experiences growing up as a member of ‘the masses’” her assignment presumes she will critique (p. 172). Cozart et al. (2016) describe how fixed writerly identities in students’ L1 might inhibit meaning-making in transfer, resulting instead in instances of language transfer as surface translation. Drawing from interviews of more than 80 individuals who consider writing a central part of their professional lives, Brandt (2018) proposes a dynamic relationship between identity and transfer of writing-related learning. She reports that the “residues of writing” illustrate a mutually influential relationship between writing and identity: not only do writers’ identities potentially influence their writing, but their writing at work potentially influences their emerging identities. Throughout this scholarship, then, is the proposition that transfer of learning cannot be fully understood without considering an individual’s full range of linguistic, professional, and personal identifications.

Agency

Scholars in cognitive and socio-cognitive traditions regularly foreground the active cognitive work of individuals who make meaning in social contexts, highlighting the role of agency in transfer of learning. Foundational to Bandura’s (1986, 1999) widely influential social cognitive theory is the idea that “human beings have some agency in the ways that they process the information they encounter—and this agency is exercised through processes of self-regulation” (1986, p. 3). Many transfer-oriented writing pedagogies operate from this position through emphasis on reflective writing as a core mechanism for students’ transfer (Downs & Wardle, 2007; Yancey et al., 2014). In these

approaches, students assume the role of a self-regulated and self-determining learner as they combine writing-related knowledge learned in class with their own experiences with writing to address future writing situations. Implicit in such approaches is the belief that students are agentic in advancing their own writing development.

Our transdisciplinary review of scholarship also suggests that resistance and failure may be important acts of agency. Lobato's (2012) actor-oriented theory (AOT), for instance, asks scholars to look at the ostensible failures of math students from a new perspective. If researchers observe a class session in which students were taught to calculate slope, and then the students later calculate slope incorrectly, that might be seen as a failure to transfer knowledge. But Lobato suggests that if researchers reexamined their data from the perspective of students, students *did* transfer knowledge—just not the knowledge or form researchers expected. Similarly, Nowacek (2011) challenges the common language of “negative transfer,” arguing that it unobtrusively validates the instructor's over students' assessment of what counts as transfer. She argues for a conception of student writers as “agents of integration” and proposes a transfer matrix that distinguishes student intention from teacher reception. Donahue (2016) similarly promotes resistance as agency, suggesting that future transfer models need to better understand students' “reuse, adaptation, transformation, and repurposing of knowledge in order to resist educational influences” (p. 113). Importantly, these studies draw on “inductive qualitative methods” to get at the “interpretive nature of knowing” and to “relinquis[h] a predetermined standard for judging what counts as transfer” (Lobato, 2012, p. 243). Empowering student writers' agency in acts of transfer means a shift away from binaries of success or failure. Rather, by centering agency in transfer, we create space for purposeful design of learning, exploration and achievement of intention, and choice-making.

Traits, States, and Dispositions

Writing studies is increasingly attending to the role of an individual's dispositions in transfer of learning. This area is ripe for continued growth and can be enhanced through deeper familiarity with the scholarship in psychology, which could further theoretical precision and extend findings and implications. For instance, psychology researchers have long worked to distinguish traits, which are “behaviors that individuals appear to perform regularly,” from states, which are

“behaviors that individuals appear to perform as a result of exposure to unusually strong external constraints or the presence of unusual physiological conditions” (Allen & Potkay, 1981, p. 917). While this distinction might be seen as an arbitrary difference between long-term personality traits and moods (Allen & Potkay, 1981; Fridhandler, 1986), the important take-away is that the term disposition has been used—both within writing studies and in other fields—in ways that deserve closer attention.

Psychology researchers often use the term *disposition* in tandem with the word *trait* (e.g., *dispositional traits*)—and indeed dispositions are often meant to describe affective responses that are more predictable than moods over the long term. Allport and Odbert (1936), for instance, argued that traits are “personal dispositions” (p. 13) and their work is often seen as the first step in identifying the Big Five personality traits: openness, conscientiousness, extraversion, agreeableness, and neuroticism. Whether they use the term disposition or not, a range of scholars seem to invoke this type of stable personality trait (e.g., Bacon, 1999; Brent, 2012; White, 2015).

Scholarship on dispositions across disciplines also draws attention to the ways in which dispositions are in a dynamic relationship with context (Bandura, 1977; Bronfenbrenner & Morris, 2006), including in writing studies (Driscoll & Wells, 2012; Driscoll & Powell, 2016; Slomp, 2012; Wardle, 2012). While not using the terminology of dispositions, other writing research emphasizes how personal characteristics might influence a writer’s ability to repurpose writing-related knowledge within particular contexts. (See Sommers & Saltz, 2004, on the novice-as-expert paradox; Reiff & Bawarshi, 2011, on how boundary crossers benefit from a certain degree of humility; and Driscoll & Jin, 2018, on the relationship between epistemologies and learning transfer.) Baird and Dilger (2018) argue for a nuanced consideration of dispositions in writing transfer that moves beyond “generative/disruptive binar[ies]” (p. 35) and “represent[s] how dispositions can interact with each other in complex ways” (p. 38). Across all discussions of dispositions, traits, and characteristics, there is a growing recognition that these individual qualities are an important factor in transfer, and that more precise distinctions and applications may yield additional critical insight for writing studies.

Embodied Cognition

One final dimension of individuality in transfer scholarship is a consideration of the role of the individual's body. Despite increased attention to the importance of the material contexts for and the physicality of writing and learning, there is relatively little work in writing studies that integrates theories of embodied cognition into transfer of learning. One exception is LeMesurier's (2016) study of dancers; she argues that "The graffiti artist, or dancer or writer, becomes acclimated to the particular muscle tensions and ways of moving that support the execution of one's repeated tasks. Such bodily acclimations can be used in processes of transfer if there is training in how to recognize and use these movements apart from their original contexts" (p. 312–13). Prior and Olinger (2019) also highlight the role of the body in writing transfer. Drawing on Olinger's analysis of gesture during interviews, they argue that "writers' metaphoric gestures embodied and shaped how they viewed writing styles" (p. 131). Finally, Rifenberg (2014, 2018) offers a detailed study of the transfer of embodied learning in football players, arguing that "student-athletes who thrive with second-nature embodied rhetoric when engaging with multimodality for their sport . . . are often not encouraged to link the body with multimodality for curricular composing" (2014, para. 3 in section on "Representing the body as a mode of meaning-making in our teaching").

This writing studies research resonates with research in sports education, medical education, and psychology. Sports education draws on theories of embodied cognition where the body is always active and present in learning (see Chapter 4 on "Transfer in Sports, Medical, Aviation, and Military Training"). The teaching games for understanding approach presented in Chapter 4, for instance, rejects the Cartesian split between mind and body and argues that learning games "offers educators a practical means through which they can provide a holistic learning experience. . . centered on the body" (Light & Fawns, 2003, p. 162). Similarly, medical and aviation education have explored the degree to which simulations are able to replicate the physical challenges and stresses of, say, stanching bleeding or landing a plane in turbulence. Within psychology, Day and Goldstone (2011) argue that spatial information—acquired from, for example, tracking balls that move from left to right or from right to left—influences the unconscious perceptual processes at work in transfer of learning. With a case study of a student learning to represent the motion of ob-

jects, Nemirovsky (2011) proposes a theory of learning transfer that integrates cognition with “episodic feelings” and bodily context and gestures. Indeed, there is a field of “4E” research—extended, embedded, embodied, and enacted (Menary, 2010)—growing out of work in distributed cognition (Hutchins, 1995) which argues that the body is a crucial element of cognition.

Such transdisciplinary views invite writing studies scholars to continue to expand ideas about how cognition and transfer of learning might be powerfully informed by bodies, other material contexts, and other people. Further areas of connection include more direct engagement with theories of embodied cognition and 4E scholarship, which are a generative avenue for questions of transfer and writing process, transfer and writing technologies, and transfer and writing spaces.

INTENTIONALITY

Our second transdisciplinary theme, intentionality, foregrounds two central questions: What is the role of conscious awareness and choice in transfer? What is the role of automaticity and routine in transfer? Such questions have been explored in depth in various subfields of psychology as well as in many fields summarized in this book. Although writing studies scholars have tended to emphasize the importance of conscious intention for repurposing prior learning, research in multiple fields also seeks to understand the role of tacit and automatized knowledge. In this section, we present such discussions and connect them to writing studies through the areas of abstract schema, metacognition and self-monitoring, and automaticity.

Abstract Schema

The claim that a sufficiently abstract schema can promote mindful transfer of learning has a long, vigorous tradition in the field of psychology. In one of the earliest explorations, Judd (1908) suggested that an abstract schema—that is, general principles provided to the participants by the experimenters to help solve their dart-throwing problem—works best when supplemented with concrete experience. Katona (1940) and other Gestalt theorists tended to value an abstract schema even more highly, arguing that specific examples may be clues towards general principles, and those general principles in turn lead

to transfer. Much research across fields shows that an abstract schema facilitates transfer, including in sports education (e.g., Bunker & Thorpe's [1982] *Teaching Games for Understanding*), second language acquisition (e.g., Figueredo's [2006] focus on transfer as a "conscious, strategic approach" (p. 893) occurring through meta-linguistic abstraction), and writing studies (e.g., Beaufort, 2007; Van Kooten, 2016). However, the causal relationship between an abstract schema and transfer of learning is not without some debate.

Even without using the language of abstract schema, writing studies has a tradition of teaching for generalizations, especially through emphasis on reflection and theory-building through declarative and procedural knowledge. For instance, Yancey and colleagues have argued that their teaching for transfer curriculum succeeds in promoting writing transfer because transfer requires the ability to contextualize those ideas "in the context of a conceptual framework" (Bransford qtd. in Yancey et al., 2014, p. 137). Their student-developed theory of writing can help students "organiz[e] what they have learned about writing through remixing prior knowledge, new theory, and new practice" in ways that "will support their moving forward to new contexts" (p. 137). Beaufort (2007) similarly argues that "learners need guidance to structure specific problems and learnings into more abstract principles that can be applied to new situations" (p. 151) and that "teaching the practice of mindfulness or meta-cognition" can "increas[e] the chances of transfer of learning" (p. 152). Future writing studies research in this area will especially benefit from engagement with abstract schema research that emphasizes explicit instruction.

Most researchers in cognitive psychology have argued that developing an appropriately abstract schema will help individuals solve novel problems, especially when guided to build and use their schema through explicit instruction like "hints." Hints not only prompt individuals to *use* their existing schemata; they guide individuals in *constructing* their abstract schema. The role of hints in developing an abstract schema has been linked to individuals' capacity to recognize analogies that promote transfer. Working with examples is another mechanism for engaging abstract schema. Experimental designs researched by Schwartz and Martin (2004) established a positive relationship between active engagement with examples and participants' ability to perform well on subsequent tests—a relationship they believe is mediated by the preparation for future learning participants

generated by working actively with those examples. Likewise, “noticing” (Lobato et al., 2012) suggests that a teacher’s actions can influence student attention in discernible ways that later have consequences for transfer of learning. Development of general heuristics is also connected to transfer through their facilitation of abstract schema.

Explicit instruction fits nicely with current work in writing about writing and teaching for transfer approaches to first-year writing. Both of these pedagogies foreground declarative writing-related knowledge and ask students to use abstractions, such as genre and rhetorical situation, to solve problems across writing situations. Following Engle’s notion of expansive framing (2006), for instance, writing instructors can ask students to generate heuristics either from concrete examples or from theoretical premises and dialogue with problems across “times, places, people, and topics” (Engle et al., 2011, p. 622). While this is a common practice in writing-transfer pedagogy, more direct connections with other disciplines not only refines these practices, but also can create alliances across the curriculum. Writing teachers can connect with faculty in education, for example, through a commitment to teaching intentionality via abstract schema and other transfer-related aims and practices. Such a partnership provides productive relationships and common purposes toward a comprehensive project of writing transfer across the university.

Metacognition and Self-Monitoring

Metacognition and self-monitoring are, at their core, about raising levels of intentionality in acts of transfer. Despite metacognition’s ubiquity across disciplines, there is “lack of clarity in [its] definition” (Scott & Levy, 2013, pp. 122–123). Some researchers have identified a range of possible components, including

Knowledge of one’s own and others’ cognitive processes; *planning* prior to performing a task; *monitoring* one’s own thinking, learning and understanding while performing a task; *regulating* one’s thinking by making the proper adjustments; *controlling* thinking to optimize performance; and *evaluating* cognitive processes after a solution has been found. (Scott & Levy, 2013, p. 123)

Notably, all these component activities suggest intentional and self-aware decisions about one's own thinking. Of particular relevance to notions of intentionality is research focused on how components of metacognition are related to self-regulation in transfer, including monitoring, regulating, controlling, and evaluating. For I/O psychology scholars interested in transfer of training, the idea of self-regulation has been crucial for training design theories focused on behavioral modeling and error management. Often, self-regulative metacognitive activity is framed as an issue of emotional control (Keith & Freese, 2005). Similarly, theories of transactive memory rely on monitoring which knowledge resides where. In particular, Wegner et al. (1985) describe the emergence of "a personal 'directory' for knowledge held by the dyad" (p. 265); this directory, which must be regularly updated to remain effective, is a mechanism for monitoring who knows what so that shared memories can be accessed when needed.

Writing studies has engaged with metacognition, but with somewhat shifting terminology. Many writing studies scholars use *How People Learn* (Bransford et al., 2000) to treat metacognition as "the ability to monitor one's current level of understanding and decide when it is not adequate" (p. 47). In their analysis of metacognition in writing studies, Gorzelsky et al. (2016) identify planning, monitoring, control, and evaluation as four metacognitive subcomponents that comprise "regulation of cognition" (p. 226). Negretti (2012) finds that writers' "self-regulatory experiences feed back into an increased awareness of conditional and personal strategies" (p. 170). However, Nowacek (2011) describes "faith in unspecified metacognitive abilities [as] tantamount to pointing to a black box in which a general cognitive ability magically operates" (p. 17).

In writing studies, the role of conscious awareness as intentionality has primarily surfaced through uptake of psychologists Perkins and Solomon's articulations of high-road and low-road transfer (Perkins & Salomon, 1988, 1989; see Chapter 2). Although Perkins and Salomon associate the conditions of low-road transfer with a "high level of mastery," by also describing it as a type of "stimulus generalization," they implicitly also associate low-road transfer with the largely discredited theory of behaviorism (1989, p. 22). The work of Kahneman (1973, 2003, 2011), too, has exposed the limitations of what he calls "System 1" thinking: "The operations of System 1 are typically fast, automatic, effortless, associative, implicit (not available to introspection), and

often emotionally charged; they are also governed by habit and are therefore difficult to control or modify” (Kahneman 2003, p. 698). However, rather than simply dismissing the automaticity of System 1 operations, he in fact launches a significant defense of System 1, valuing the ways in which System 1’s tacit knowledge works in partnership with the explicit knowledge of System 2. So, while deliberate mindful abstraction remains important, the importance and value of the kind of tacit, automatized thinking associated with System 1 also is compelling for future transfer research in writing studies.

Automaticity

Automaticity of transfer would seem the antithesis of the intentional, mindful transfer of learning discussed so far. Indeed, automaticity is the site of considerable tension and even mistrust. Supposed failures in mindful abstraction (an overrun of automatic, low-road, System 1 thinking) result in negative transfer, for instance, which Schunk (2004) defines as when “prior learning interferes with subsequent learning” (p. 217). Beaufort (1999) describes negative transfer as instances in which the “norms of one discourse community were inappropriately transferred to a very different context for writing” (p. 183). Management scholars focused on innovation worry that routines will inhibit innovative responses to new business contexts (Walsh & Ungson, 1991, p. 76).

However, some fields and scholars have also documented significant advantages of automatized learning for transfer of learning. For instance, knowledge management scholars have argued for the crucial role that tacit knowledge plays in innovation, documenting the ways in which tacit knowledge becomes explicit and then—if it is to become a truly sustainable innovation—tacit once again (Nonaka, 1994). In psychology, some scholars have actively praised the importance of deeply internalized, even automatized knowledge. In medical and aviation education, researchers note that automatized learning is desirable; surgeons and pilots make life-or-death decisions so quickly and so often that if they regularly relied on deliberate, mindful, high-road transfer, it would be at their peril.

Writing studies is just beginning to explore the role tacit knowledge and more routine, automatized experiences might play in transfer. Donahue (2012) notes that “although much has been made of . . . meta-awareness as one of the key components of successful trans-

fer, some research is beginning to question its role”; preliminary results from her own study suggest that “mature practices might indeed develop without an accompanying meta-awareness” (p. 155). And although Wardle’s claim that “meta-awareness about writing, language, and rhetorical strategies in FYC may be the most important ability our courses can cultivate” (2007, p. 82) is often cited in work spotlighting the value of meta-awareness, she has also noted that her claim was fundamentally about what the FYC course is best suited to do—not a claim that meta-awareness is required for transfer of learning (2018). Schieber (2016) argues that although her two case studies evidenced “excellent use of rhetorical flexibility,” that transfer was “unintentiona[l]” and “invisible” not only to the instructor but to the students themselves (p. 480).

Important for future research on writing transfer, then, is balancing an emphasis on mindfulness and automaticity. Metacognition and automaticity, rather than separate faculties at odds with one another, might be reframed as intertwined in lifespan learning. Future research also should examine how so-called failures of transfer (like negative transfer and interference) might be part of a longer and more complex process to capture. Automatic response is not a failure in this view. Rather, it may be, as Kahneman intimated, that automaticity and mindful abstraction in writing rely on one another in long-term writing development. In this way, writing teachers and researchers might gain a more complex vision of writerly intention and agency.

FIDELITY

Our third transdisciplinary theme, fidelity, addresses the relational possibilities between learning and performance contexts. Simply put, fidelity is the “likeness” between contexts and the role such similarity plays in transfer. This useful construct comes from studies of transfer and simulations (in medical education, aviation education, military education) where it refers to “the extent to which the appearance and behavior of the simulator/simulation match the appearance and behavior of the simulated system” (Maran & Glavin, 2003, p. 23). While fidelity does imply a match, more often, research is more concerned with the complicated relationships between simulated, classroom practice, and real-world environments, concerns that recall Perkins and Salomon’s (1988) pedagogical approaches of “hugging” and “bridging.”

Across fields, scholars examine fidelity itself, how to evoke fidelity, and how to help learners enter low-fidelity contexts in order to understand transferable skills, knowledge, and actions. This section sorts fidelity across dimensions: situated learning, high/low fidelity's role in simulations and scaffolding, and context proximity and perception. Each dimension complicates and extends writing studies' questions about how to build connections between learning and performance contexts.

Situated Learning

Situated learning theory, such as Lave (1988) and Lave and Wenger's (1991) work on cognition in practice, communities of practice, and legitimate peripheral participation, suggests that fidelity in practice and participation is necessary for learning and for transfer. For Lave and Wenger, learning happens when newcomers actively engage with a community-defined context. A newcomer must participate with more expert members in order to develop competencies in the group's socio-cultural practices. From this perspective, fidelity is critical for learning and includes working with a community expert and receiving on-going feedback on community practices over time. Specifically, the process of legitimate peripheral participation (engaged, social participation) is an example of a high fidelity (high likeness) learning experience. In sports education, situated learning theory has informed questions of what counts as fidelity in training that involves the deep interactions of the body and mind. And medical education builds from situated learning theory to expand its theory of fidelity to questions of how to develop the most effective simulations for learning about medical care.

Writing studies has long debated the utility of general writing skills given overwhelming research on situated learning and situated literacy (Russell, 1995; Petraglia, 1995). A similar debate has animated discussions of transfer in second language writing (Currie, 1993; Spack, 1988). While such debate is not settled, theories of situated learning show that active engagement with communities of practice and their genres provide fidelity of writing contexts through "context-conceptions" rather than "individual" or "task-based" learning models (Wardle, 2007). Teaching for transfer through the lens of situated learning (where writers engage deeply and meaningfully with community practices and members) suggests that fidelity of practice should be complemented by a focus on scaffolding, modeling, awareness, and

metacognition to help learners generalize specialized learning to a transferrable outcome.

High and Low Fidelity

Theories of situated learning generate concern over the similarities or differences between types of performance contexts, both classroom and workplace. Thorndike's (1906/1916) early theory of "identical elements" promoted the idea that learners make connections (associations) between tasks or contexts when prompted by identical surface features and that these can work in a complementary way to improve overall performance. As Thorndike argued, "One mental function or activity improves others in so far as and because they are in part identical with it, because it contains elements common to them" (1906/1916, p. 243). Although this work has been subsequently critiqued, identical elements theory provides influential background for work on simulations across education, aviation, military training, and human resources. This tension exemplifies how theories of transfer, moving through cycles of behaviorist, cognitive, and social approaches, retain currency over time when they meet student, practitioner, or trainee needs.

To name types of likeness among identical elements, simulation training has distinguished between high and low fidelity. High fidelity means that there is a close likeness to the real while low fidelity means that the likeness is partial or distant. When comparing contexts, researchers often distinguish between multiple dimensions of high and low fidelity. For example, researchers in military education note that "Fidelity is not a simple high/low dichotomy, rather it is multiple compound continua" (Alexander et al., 2005, p. 6). Dimensions that define high or low fidelity can include "surface features" that are "problem-specific," "domain-specific features of training examples," and "deep (structural) features [that] refer to the underlying principles imparted in training (Alexander et al., 2005, p. 2; see also see Gick & Holyoak, 1987). Importantly, scholars note that more fidelity does not necessarily mean a better transfer outcome. Rather, what matters is how "the level of fidelity captures the critical elements/properties of the skills/tasks you wish to teach;" if it does, then that "level of fidelity is sufficient even if it noticeably deviates from the real world" (Alexander et al., 2005, p. 6).

While other fields may not use the term *fidelity* when studying or creating transfer-friendly contexts for students, scholars and educa-

tors have experimented with aspects akin to high and low fidelity in teaching for transfer. For instance, school-to-work studies ask how a classroom's level of authenticity to real work environments can move students from school toward workplace writing, using simulations, client-based projects, service-learning projects, and internships to support transfer of learning. Simulations in these examples differ from simulations in medical, aviation, and military where simulation pedagogy ranges from case studies to highly advanced electronic and digital environments. Rather, simulations in professional and technical writing classrooms provide low fidelity activity through constructed case studies and imagined real-world audiences and exigencies. Such classrooms, while superior to classrooms with no project-oriented assignments (Herrington, 1985), have been criticized as pseudotransactional (Spinuzzi, 1996) spaces where "the real audience for the students was always the professor—in his role as professor" (Freedman et al., 1994, p. 203).

Interestingly, findings from school-to-workplace studies have not found much value for transfer in low fidelity contexts; this contrasts with work in medical education that suggests there are times when high fidelity (high likeness) between the simulated and real-world contexts is too complex for novice students to engage in right away. In fact, Maran and Glavin (2003) have suggested that presenting novice learners with every dimension and real-world complexity may hinder students' ability to progress. But school-to-workplace studies have found more success in higher fidelity contexts such as client-based approaches, in which students work with actual clients in the service of real workplace needs. But even in these higher fidelity situations, scholars have found that any distance or discrepancy between school and workplace activity systems can cause conflict or confusion (Dannels, 2003). Research on internships shows that writers who are more used to being students than workers do not simply apply what they know in the workplace setting; rather, they must move into the culture and activity of the community of practice. For instance, Anson and Forsberg (1990) show that interns need to enter the writing and working culture, participate in its activities over time, and adapt prior knowledge to those new expectations. In this way, fidelity is more than situational likeness; it also accounts for learners' motivations and goals for engagement. Thus, fidelity is a co-constructed phenomenon that includes context, activity, and individual.

Scaffolding

Scaffolding offers one method for moving novices toward more expert status through carefully sequenced activities. While educators can scaffold in multiple ways, this section focuses on how scaffolding for transfer moves learners across low- to high-fidelity contexts. Finding or contriving fidelity-oriented contexts (simulations, client-based approaches, or internships) and determining what they will include is a form of scaffolding for transfer. Two types of fidelity scaffolding rarely taken up in writing studies—progressive fidelity (Norman et al., 2012, p. 644) and concreteness fading (Fyfe et al., 2014)—suggest additional avenues for writing transfer research. In progressive fidelity, developed from research arguing that novices are “better off with simpler models and should gradually move to more complex models as their skills improve” (Norman et al., 2012, p. 644), learners engage in “a series of learning environments of increasing fidelity” (Teteris et al., 2012, p. 141). Scaffolding between low and high-fidelity contexts occurs by building up and out of various context dimensions.

Concreteness fading, on the other hand, employs a combination of concrete and abstract types of scaffolds to transition learners toward transfer potential. Concreteness fading comes from educational psychology research on the value of concrete and abstract learning. Some scholars emphasize that transfer is assisted when concrete examples are not offered (Kaminski et al., 2008, 2013), while others suggest concrete variables—such as the body and bodily action—are required for transfer because they interact with cognition (Nemirovsky, 2011; Pouw et al., 2014). Fyfe et al.’s (2014) work on scaffolding for transfer connects these views through concreteness fading, which moves learners from the concrete to the abstract. Stages include enactive (focusing on concrete models and physical experiences), iconic (stripping away extraneous details and using more formal graphic symbols to link the concrete experience to the conceptual), and symbolic (using an abstract model to “highlight relevant structural patterns” [p. 12]). Fyfe et al.’s findings showed that students who started with concrete simulations/visualizations of activity and ended with more abstract representations of the task had more successful transfer results. Through scaffolding via both concrete and abstract methods, rather than one or the other, transfer was increased.

While scaffolding is commonly used in writing courses to help students transfer their writing-related knowledge, progressive fidel-

ity shows how scaffolding for transfer could impact course sequence design. Concreteness fading also could influence the sequencing and interrelationship of concrete and abstract writing-related knowledge. Engagement with such lesser-known approaches to scaffolding can increase writing studies' theoretical and pedagogical repertoire for building on existing efforts (e.g., writing about writing or teaching for transfer approaches) to empower students' transfer of writing-related knowledge.

An integral element of scaffolding through fidelity is the role of mentors and teachers in these processes. Sports education, for instance, emphasizes the role of teacher dialogue and feedback in the learning process. The teaching games for understanding approach, for instance, stresses the need for coaches and peer guidance in learning, with the ultimate goal of fading the guide's support over time (Lopez et al., 2009). While writing studies has focused less on the role of facilitative learning through scaffolding, recent research suggests that engaging students in "transfer talk" ("the talk through which individuals make visible their prior learning") can be part of a scaffold that primes for transfer (Nowacek et al., 2019, para 7). In writing, which is a complex, ill-structured, and rhetorically variable practice, such dialogic interaction is especially critical in orienting students toward flexible and creative (rather than rigid and application-oriented) acts of writing transfer.

Modeling

Given the importance of context-to-context and task-to-task fidelity in teaching for transfer, modeling (providing examples that model later behavior) also is suggested across fields as an effective transfer tool. For example, psychology research on transfer has long been interested in schemas or concepts: abstract knowledge representations that explain multiple applications of a principle (Hammer et al., 2005, p. 95). Given the importance of schemas for aiding transfer—as they enable a flexible recombination of knowledge for discrete types of local problem-solving—researchers have asked how learners can develop transferable schemas. Gick and Holyoak (1983) found that for learners to articulate a schema, they needed to build an abstract infrastructure from multiple stories and examples. Beyond merely reading examples, learners need to actively compare and draw connections between them (Gentner et al., 2003).

Training design in industrial and organizational (I/O) psychology also relies on behavior modeling that aims to direct attention, encourage retention, and increase motivation. Linked to Bandura's social theory of learning (Baldwin, 1992), behavior modeling involves a trainee overviewing the component parts of the task or skill to be learned, observing models, practicing, getting feedback, and applying the training in the workplace (Pescuric & Byham, 1996; Taylor et al., 2005). Like schema development, behavior-model training seeks generalization from an observation for application in a future context. Additional studies have provided trainees ranges of positive and negative models to learn from, examining the level of generalization achieved.

Implications of modeling for writing transfer are already in play within writing classrooms, writing centers, WAC programs, and first-year writing. For instance, work on "explicit modeling" in WAC/WID contexts highlights the value of students gaining more abstract concepts to guide transfer. Within first-year writing, use of multiple examples (Gick & Holyoak, 1983) and comparing examples (Gentner et al., 2003) are used to help students develop writing-related schemas. In genre approaches to first-year writing, for example, analyzing multiple disciplinary genres for their rhetorical, procedural, formal, structural, and linguistic features provides students with a self-developed schema of that genre in use (Devitt et al., 2004). Other approaches such as teaching for transfer (Yancey et al., 2014) call on schema/theory development as a goal for first-year writing. What becomes clear across fields is just how much teaching writing, even though not always explicitly referenced as such, draws on and works from similar theories of model comparison in efforts to develop abstract theories of writing (schema, concepts, generalizations) to transfer across contexts.

Proximity and Perception

Proximity—closeness or distance in space, time, or association—captures additional aspects of fidelity. Transfer is aided when students perceive the differences and similarities (fidelity) between contexts (Walvoord & McCarthy, 1990) and when they experience "an increasing level of domain-specific knowledge" of thinking and writing skills over time (Smit, 2004, p. 185). Gaps between "expert and novice thinking" (Middendorf & Pace, 2004) are likewise an obstacle to the transfer of writing-related knowledge across the disciplines. The decoding-the-disciplines model sees transfer as intrinsic to disciplin-

ary writing development and seeks to understand where transfer might break down. To break through a “bottleneck” (Middendorf & Pace, 2004), students need help to decode the discipline through explicit faculty intervention like careful sequencing, classroom assignments, and lectures and meta-discussions of discipline-specific writing.

While the above writing studies scholars emphasize the importance of proximity to support the transfer of knowledge, perceptions of that proximity also factor into transfer acts. For example, human resources research on transfer focuses on “work-environment factors perceived by trainees to encourage or discourage their use of knowledge, skills, and abilities learned in training on the job” (Cromwell & Kolb, 2004, p. 451). Such objects of perception can include supervisor support, peer support, and opportunity to perform. Critically, the objective existence of such support is beside the point if trainees do not perceive the support. Just as affordances can be put in place to help writers transfer and expand their writing-related knowledge across the curriculum, human resources scholars suggest that situational and consequential cues can move trainees toward a perception of the fidelity of similar contexts (Rouiller & Goldstein, 1993). Concern with gaps in perception and how to encourage shifts in perception have also been explored in second language writing (James, 2008), first-year writing (Wardle, 2007), and writing across the disciplines (Bergmann & Zepernick, 2007). For instance, Bergmann and Zepernick find a problem of transfer to be “not that students are *unable* to recognize situations outside FYC in which those skills can be used, but that students *do not look for* such situations because they believe that skills learned in FYC have no value in any other setting” (p. 139).

One possible area for further exploration in writing studies is the role of embodied cognition in making transfer possibilities perceptible to writers. Aviation education attempts to remedy perceptual challenges so that trainees are able to experience what would be a perceptual likeness between the simulation and a real flying situation with a focus on visual, interactional, and kinesthetic fidelity. As Robinson and Mania (2007) have opined, “identifying ways to induce reality rather than simulating the physics of reality is a scientific challenge to be addressed by all future generations of simulators” (p. 134). In studies where perception is of core concern for transfer, fidelity between contexts is not made through material likenesses; rather, transfer is

prompted by cognitive and embodied recognition in concert with environmental factors.

DIRECTIONALITY

Transformation, if it is going to happen at all, will happen in multidirectional ways, in no predictable time frame, and often in spaces beyond the institutional gaze. . . . the unpredictability of knowing if or how or where or when these attempts will lead to the kinds of transformations they sought. (Barron & Grimm, 2002, p. 76).

In this quotation, Barron and Grimm are writing about transformation in the writing center, specifically changes in tutors' thinking about racial justice. But the way they tie multidirectionality to transformation sets the stage for our fourth transdisciplinary theme: directionality. Barron and Grimm explain that transformation occurs "in multidirectional ways, in no predictable time frame, and often in spaces" they can't see. They thus place transformation in time and space, stressing the unpredictability of the "where or when" of change. Similarly, the theme of directionality across this book's chapters links time and space to map the movement of transfer. While some transfer concepts explicitly speak of "prior" and "future" times, others are motivated by questions of how knowledge is "moved" or "carried forward" by learners coming from and on their way to future spaces. Thus, our theme of directionality highlights how past contexts—including spatial and embodied elements—influence the learner's present. Like other sections in this conclusion, the theme of directionality challenges one-way application models of transfer in favor of more complex and dynamic ones (Matsuda, 1997), treating writing development as uneven, happening in fits and starts, and transformational when woven through new writing situations (Carroll, 2002).

For example, stressing the directionality of forward and backward reaching transfer highlights how learners seek prior resources for transfer from other times and spaces. Perkins and Salomon (1988) embed forward and backward reaching transfer into the process of high-road transfer, which "depends on deliberate mindful abstraction of skill or knowledge from one context for application in another" (p. 25). In forward reaching transfer, a learner might take from a current situ-

ation and abstract requisite skills, strategies, or capacities for future situations. Backward reaching transfer, on the other hand, a learner attempts to link a present task or situation to a memory that might then be pulled forward to help achieve the current task. These contexts and memories are times and places that learners turn to in enacting transfer. Thinking of those turns as directional can help give spatial and embodied dimension to the transfer act. In this section, this potential is categorized in three ways: forward, backward, and multidirectional.

Forward: Preparation for Future Learning

Scholarly conversations across several fields explore how to make explicit use of learners' futures to guide them toward successful transfer. This work pivots around forward-looking terms like "potential," "anticipated," or "imagination." One such conversation is preparation for future learning (PFL) (Bransford & Schwartz, 1999; Schwartz et al., 2005). Bransford and Schwartz argue for helping students learn to be future learners (see Chapter 2). Such research emphasizes that transfer should be treated as forward-looking, leading learners to imagine future times and spaces for knowledge use. Preparation for future learning has been used within writing studies, but only sparingly. Within writing center research, Driscoll (2015) developed and studied a tutor education course that brought together PFL with Perkins and Salomon's (2012) "detect-elect-connect" model. The result was a course that focused on forward-looking concepts like adaptability or resource use while asking students to actively connect learning to new or future contexts. Driscoll and Harcourt (2012) found that such a deliberate, forward-looking approach did activate transfer-like thinking to build connections among multiple contexts.

Forward: Framing

Researchers also have theorized and studied additional types of forward-looking transfer, forwarding concepts like *framing* or *activated resources*. Drawing on the work of Tannen in linguistics and Goffman in anthropology, Hammer et al. (2005) define framing as "a set of expectations an individual has about the situation in which she finds herself that affect what she notices and how she thinks to act" (p. 98). As "meta-communicative signals" (Engle, 2006, p. 456), frames can either keep contexts isolated or help to connect them when cued

by intercontextuality (Hammer et al., 2005). To forge connections or build environments that encourage connections, Engle et al. (2011) contrast “expansive” with “bounded” framing to suggest that the former has the potential to activate a constellation of associations to prior knowledge, thus bearing a “family resemblance” to what Gick and Holyoak (1980, 1983) have called hints. In this way, transfer can be prompted when frames connect. Further, while frames are primed for future use, they may remain dormant if they are too bounded. Rather, “encourag[ing] students to orient to what they know as being of continued relevance across times, places, people and topics” (Engle et al., 2011, p. 622) may prompt forward-looking transfer.

Echoing Gick and Holyoak’s (1980, 1983) approach to framing connections across resemblances, Lindenman’s (2015) work on meta-genres shows how students create connections with genres across domains even when researchers and teachers aren’t aware of those connections. In other words, Lindenman shows how student writers generate their own sets of genre family resemblances (meta-genres). Arguing that students more typically work from those affiliations rather than ones imposed through instruction, Lindenman asks writing studies scholars to reconsider the boundaries placed around literacy domains, resonating with Engle’s contention that expansive frames are necessary to see and teach for transfer. When educators work within the logic of students’ metagenic umbrellas, they follow students’ future-looking transfer routes rather than presupposing where and when students will transfer knowledge.

Forward: Lateral and Vertical Transfer

Another set of scholarship that explicitly emphasizes forward-looking transfer is work on lateral and vertical transfer in course and curricular structuring. In writing across the curriculum scholarship, lateral transfer refers to synchronous courses designed to aid transfer of writing-related knowledge by linking analogous writing experiences such as writing classes connected with service-learning experiences (Lettner-Rust et al., 2007). Vertical transfer, on the other hand, addresses student transfer opportunities throughout a curriculum, from first-year writing up to senior year. Vertical models support student writing development through curricular design that explicitly teaches for transfer. Research suggests that students benefit from encountering (a) concepts over time and across contexts; (b) opportunities to apply learned con-

cepts, skills, or strategies to new situations; and (c) sequenced learning contexts that increase in complexity (Crowley, 1998; Hall, 2006; Jamieson, 2009; Melzer, 2014; Miles et al., 2008; Smit, 2004). While researchers advocate for connecting first-year writing to a vertical curriculum, research thus far has not shown students linking the two on their own. This has led to the recommendation for building in “programmatically cues” (Bergmann & Zepernick, 2007; Wardle, 2009) and affordances (Greeno et al., 1993) as catalysts for transfer across the curriculum. Such research suggests that while transfer might happen for students without intervention, educators can encourage students to move their knowledge forward through intentionally designed curricular structures and well-placed transfer affordances.

Sports education also uses a lateral and vertical model, but rather than building connections across courses, scholars are interested in how students build transfer between games. Lateral transfer (Mandler 1954 referenced in Lopez et al., 2009, p. 51) requires a “common approach” to a category of games rather than the teaching of specific games. Theories and studies of “transfer of tactical solutions” have relied on a long-held schema that sorts sports into categories (Thorpe et al., 1984) in terms of “fundamental tactical principles [and] structural elements” (Lopez et al., 2009, p. 52): invasion, net/wall, striking/fielding, and target games (see Chapter 4 in this volume). Here, vertical transfer describes sports similar enough in terms of tactics and structure to be learned sequentially or scaffolded onto one another (Holt et al., 2002; López et al., 2009; Werner & Almond, 1990). In other words, vertical transfer requires identifying simpler to more complex skills and strategies and presenting those in a meaningful order.

Backward: Prior Knowledge and Reflection

In their book *How People Learn: Mind, Brain, Experiences, and School*, Bransford et al. (2000) affirm that “new learning involves transfer based on previous learning” (p. 53). In this way, theories of prior knowledge characterize how writers look back to previous places and times to find a basis for future action. Most prior knowledge scholarship reviewed in this book comes from writing studies, although sports education also relies on the construct of prior knowledge to develop its teaching for vertical or lateral transfer. Writing studies research focusing on the role of prior knowledge confirms that prior writing knowledge shapes the writers’ contexts as they encounter new

writing tasks. For instance, research has shown that prior writing-related knowledge impacts attitudes toward writing, strategies that writers draw on when encountering new tasks, and the literacy practices that writers associate with a given composing activity or genre. Writers are always making use of prior knowledge, knowingly or not. The use they make impacts writing performances in the present (Jarratt et al., 2009; Nowacek, 2011; Reiff & Bawarshi, 2011; Robertson et al., 2012; Rounsaville et al., 2008).

A set of studies helpful for understanding prior knowledge is found in scholarship on adult learners with lifelong workplace knowledge returning to school (Gillam, 1991; Michaud, 2011; Navarre Cleary, 2013). For example, Michaud's (2011) "reverse commute" study reports on adult learners who bring generationally inflected resources to new writing contexts. Such work-to-school scholarship has close kinship with much literacy research on home-to-school transfer that documents the matches and mismatches between home, school, and work contexts. Literacy studies shows that rather than attribute mismatches to student failure, scholars might look instead to the uneven impact of sociocultural practices and values on students' transfer challenges. Reading even the preceding studies through that lens offers a robust explanation of what is bound up in the prior knowledge that shapes writers' activities in the present.

Reflection involves looking back to rethink prior knowledge. Writing reflection, in particular, assumes that explicit backward thinking has the potential to reformulate prior experience and make it relevant for supporting the transfer of knowledge. Within writing studies, Beaufort (1999, 2007), Downs and Wardle (2007), and Yancey et al. (2014) provide teaching recommendations that take advantage of this deliberate writing move. Beaufort is one of the first writing scholars to connect transfer, mindfulness, and reflection of writing-related knowledge. Based on her case study, Tim, as he moved from first-year writing into his discipline-specific courses, Beaufort (2007) suggests a set of principles for fostering transfer such as principle 3, which suggests "constantly connecting new and already gained knowledge" about writing (p. 182). Beaufort's work serves as a foundation for pedagogies such as writing about writing and teaching for transfer that similarly rely on reflection.

Backward: Negative Transfer and Interference

As a framework for studying and interpreting transfer, negative transfer refers to the ways prior knowledge interferes with or disrupts new learning. While “positive” transfer tends to indicate transfer acts that improve performance—what has been carried forward into the present context supports learning—negative transfer seeks to name a problem. Negative transfer can mean new learning is made worse through such “interference” (Schunk, 2004), with interference being used to indicate syntactic or morphological error as evidence of failed or negative language transfer (Gass & Selinker, 1992; Selinker, 1969, 1972; Weinreich, 1953). The sometimes synonymous use of interference and negative transfer seems to have lasting power as a depiction of transfer in both speech and writing (see Chapter 6 in this volume).

Writing studies scholars also widely engage with notions of negative transfer. Beaufort (2007) shows how case study Tim inappropriately applied genre conventions across contexts as evidence of negative transfer. Nowacek (2011), on the other hand, has questioned the value of negative transfer as a framework and instead warns against the difficulty in determining whether an act is negative or positive transfer, noting that the researchers’ answer to that question will depend on their “assessment criteria” (p. 27). When, for example, transfer is only deemed positive if a student accomplishes teacher-defined outcomes, researchers miss other signs of transfer such as emotional moments of “transfer as revelation,” as well as how an experience might weave into “the individual student’s conception of self and larger trajectory of intellectual and emotional development” (p. 27; see also Lobato, 2012). In fact, scholarship throughout this book shows that the binary of negative and positive transfer is disrupted when learning is studied longitudinally (over time and across contexts) and holistically (involving discursive as well as non-discursive sites of experience).

In a similar vein, sociocultural studies of literacy complicate negative transfer by situating the transfer of writing-related knowledge, and any prior knowledge and writing-related values, within the ideological boundaries between in- and out-of-school literacy. For example, Heath’s (1983) ethnography showed that successful transfer of learning was directly linked to when and how children’s prior literacy knowledge aligned with the school’s definitions and practices of literacy. But using a sociocultural lens for literacy events, Heath did not locate negative transfer within struggling students, but rather in the

mainstream school's white, middle-class values. These powerful relations are critical to any discussion of assumed failures of transfer and should inform any robust study of writing transfer.

Multidirectional

While the theme of directionality mostly captures forward- or backward-looking transfer activity, some transfer scholarship reviewed in this book indicates both forward *and* backward directionality. That is, some scholarship considers the two-way movement of transfer acts. For example, cross-linguistic influence (Sharwood-Smith & Kellerman, 1986) suggests that transfer among languages can happen no matter the order of language learned (L1, L2, L3, etc.). In fact, a number of terms in second language acquisition—reverse transfer, backward transfer, the L2 effect—stress how a target language can also influence the source language due to the multi-directional movement of language elements during learning (Cook, 2003; Helfenstein; 2005; Jarvis & Pavlenko, 2008; Pavlenko, 2000; Pavlenko & Jarvis, 2002). In describing “those processes that lead to the incorporation of elements from one language into another,” cross-linguistic influence accounts for the unpredictability sometimes absent in uni-directional articulations of language interference or reverse transfer (Sharwood-Smith & Kellerman, 1986, p. 1).

In writing studies, multidirectional movement characterizes Taczak and Robertson's (2016) four-part approach to reflection practices for transfer, including reflecting backward, inward, forward, and outward (p. 46). Dinitz and Harrington's (2014) research on writing center tutors' disciplinary expertise illustrates tutors' ability to guide writers' multidirectional transfer. They found that tutors with disciplinary expertise helped writers generalize rhetorical lessons, facilitating forward *and* backward reaching transfer through a kind of “push back and push forward” tutoring (p. 90).

Most substantially, long-standing research on the transformation of knowledge treats transfer as happening “in multidirectional ways” in that learning cannot be traced along predictable paths or timelines (Barron & Grimm, 2002, p. 76). Much of the research reviewed in this book treats the transfer act as the transformation of knowledge, shaped through “active interpreting, modifying, and reconstructing the skills and knowledge transferred” (Tuomi-Gröhn et al., 2003, p. 4). Transfer as transformation stresses change, unpredictability, multi-

plicity, reconstruction, and creativity. For example, Nowacek's (2011) principle of reconstruction emphasizes that "both the old and new contexts" for transfer "as well as what is being transferred" all transform during acts of recontextualization (p. 25). DePalma & Ringer's (2011) theory of adaptive transfer rearticulates transfer as transformation, emphasizing the ways that transfer is idiosyncratic, rhetorical, and multilingual (p. 141). In writing center studies, Johnson (2020) emphasizes the seemingly idiosyncratic or incidental transformations of knowledge that reveal transfer at work in the writing center (para 7). She follows Smart and Brown (2002) in defining the "transformation of learning" as "the reinvention of expert practices" (p. 122). She argues that transfer can be taught through incidental opportunities (rather than planned lessons that require longer periods of time) when transfer is recognized to be constant and ongoing knowledge transformation rather than "clear cut moments of knowledge application" (para. 24). From this vantage, transfer must include writers' creative and agentic capacities to negotiate meaning with readers and to shape—transform—knowledge as they learn.

SIMULTANEITY

Our final transdisciplinary theme, simultaneity, characterizes the layered quality of singularity. In terms of transfer this means the single occurrence of multiplicity: multiple contexts, variables, and languages that condition a single transfer act in a particular way. We provide three understandings of simultaneity below, approaching theories of concurrent contexts (multiple contexts shaping a single transfer act), dimensionality (multiple factors shaping a single transfer act), and multicompetence (multiplicity in a single language system) as demonstrations of this holistic understanding of writing transfer.

Concurrent Contexts

Scholars emphasizing simultaneity in the transfer act consider how concurrent contexts—situations co-occurring, existing or happening at the same time—shape single transfer acts. Research that approaches transfer this way highlights the temporal and spatial qualities of transfer—how times and spaces regarded as distinct entities actually bleed into each other, causing writers to be influenced by multiple spaces or

times at once. For example, writing center researchers consider concurrent contexts because of the way multiple disciplinary discourses co-occur in a single session. Because tutors and writers bring distinct disciplinary expertise to bear on single writing events (the text or task at hand) the writing center acts as a station through which multiple academic discourses shuttle and stop for collaborative exchange. Tutors are specialists in writing (many having taken full courses in writing center studies prior to tutoring) as well as in a variety of disciplines, and act as “handlers” who guide writing knowledge across these disciplinary backgrounds as well as those of the writers they work with (Nowacek, 2011). Similarly, Alexander et al. (2016) say the multiple literacies that students bring to writing center sessions are inevitably networked, with tutors and writers linking multiple literacies as they collaborate to make meaning in talk and writing. These scholars emphasize that simultaneity helps reframe academic writing knowledge as multiple, adaptable, and emergent (Walker, 1998).

The notion of *networked knowledge*, stemming from multiple contexts but existing in single spaces also resonates with Lemke’s (2000) “heterochrony,” the interlocked nature of various timescales. Referring to the relationship between school and “real life” contexts, Lemke notes that dichotomizing such spaces, as if students aren’t always informed by knowledge from both at the same time, ignores the overlap of these contexts in everyday writing decisions. When writing studies scholars take up heterochronic frames, simultaneity becomes instantiated in theories like chronotopic lamination, Prior and Shipka’s (2003) theory which, following Bakhtin’s chronotope, foregrounds “the simultaneous layering of multiple activity frames and stances” that inform any single writing moment, all of which together comprise the lifespan development of writing expertise (p. 187). This theoretical stance informs Prior’s (2018) rejection of Dias et al.’s (1999) “worlds apart” thesis, saying that any understanding of writers’ “becoming” approaches the transfer of writing knowledge not as a tortured reaching-across of distant writing contexts but rather a fact of life. Instead, he treats writing knowledge as sets of already existing “continuities of learning across time and setting” that are a “fundamental necessity for any conceivable account of human development” (in the section on “Worlds Apart vs. Laminated Worlds”) and by extension any understanding of the transfer of writing knowledge.

Dynamic Dimensionality

The simultaneous quality of transfer also shapes how scholars in many fields approach the material and sociocultural dimension of transfer. This lens in transfer research attends to the influential factors that shape a single transfer act, variously called dynamism or multi-dimensionality. For example, studies in medical education consider the material factors that influence the ability of medical students to transfer knowledge from simulation to real world healthcare contexts. This aspect of the notion of fidelity (see Chapter 4) attends to a learning context's "multi-dimensionality" when a study considers how a healthcare professional's patient interactions are shaped by environmental factors like noise; psychological factors like bedside manner; and physical factors like motion economy, dexterity, and accuracy. These multiple factors all come to bear on single learning contexts, shaping the fidelity of that context to others and the likelihood of a medical student to transfer skills across them.

In addition to material considerations, research across fields also incorporates the multiple sociocultural dimensions that can shape transfer acts. For example, researchers in second language writing consider multiple dimensions such as grammatical proficiency (Berman, 1994; Cumming, 1989; Wolfersberger, 2003); educational experiences with writing (Cozart et al., 2016; Kobayashi & Rinnert, 2008; Kubota, 1998; Mohan & Lo, 1985); L1 literacy (Carson & Kuehn, 1992; Mohan & Lo, 1985); and student characteristics, motivations, and intentions (Cozart et al., 2016; Kobayashi & Rinnert, 2008). Matsuda's (1997) "dynamic model of L2 writing" expanded the factors that might influence the transfer of writing knowledge among languages, pointing researchers beyond over-determined cultural patterns toward additional factors such as educational background, the shared discourse community of a text's writer and reader, and the genre expectations of that text. Matsuda's model is dynamic in that it centers a written text as an interaction of a writer and reader, who come together to shape the sociocultural conditions for transfer. Other L2 writing research has followed Matsuda's (1997) lead to include "variations within his or her native language (i.e., dialect) and culture (i.e., socioeconomic class), his or her knowledge of the subject matter, past interactions with the reader, and the writer's membership to various L1 and L2 discourse communities" (p. 53).

Other studies of transfer influenced by dynamism include Hayes et al.'s (2016) use of dynamic transfer, which they define as a theoretical lens that can fully account for the interaction of inner/cognitive and outer/social dimensions that shape student learning called for by earlier composition scholars such as Bizzell (1982/2003). Similarly, Martin and Schwartz (2013) frame students' initiation of prior knowledge as dynamic transfer in order to account for the ways learners coordinate prior and new knowledge as they learn in new contexts. In all these studies, researchers use dynamism to incorporate not only multiple factors shaping single transfer contexts, but also to highlight the holistic quality of their interaction. Multiple dimensions do not stay distinct as they shape transfer acts, but instead fuse to create new conditions for transfer that students and writers must navigate anew during each transfer act.

Multicompetence

As is fully defined in the chapter on transfer in second language writing (see Chapter 6), Cook (1992) proposed the term multicompetence to describe language knowledge with more holistic complexity than previous understandings of bilingualism had allowed. He defines multicompetence as "the overall system of a mind or a community that uses more than one language," promoting relationships among languages of various proficiencies including any other known languages and interlanguages (Cook, 2016, p. 24). In other words, multicompetence describes the whole of language relationships rather than the sum of two monolingual parts. In this understanding, a language repertoire is a total linguistic system of interaction rather than a network of isolated individual languages. Therefore, multicompetence demonstrates simultaneity in its fusion of language multiplicity into a single language system. Following this line of thinking, when writers engage in language transfer, they call on multiple languages, of varying proficiencies. This allows researchers to consider the ways that transfer is not an addition of new linguistic knowledge but is instead the "re-jigging of existing knowledge or behavior into new configurations," a holistic reimagining of one person's language competence (Cook, 2016, p. 33).

Similarly, second language acquisition scholars who use complexity and dynamism in their theoretical frameworks tend to emphasize fluidity of language transfer. This work argues that lived language

transfer is more volatile than one static language construct moving from one concrete context to another (Cenoz & Gorter, 2011; Garcia & Wei, 2014; Grosjean, 1989; Larsen-Freeman, 1997, 2013; Larsen-Freeman & Cameron, 2008). A dynamic understanding of language transfer, with affinities to dynamic and emergent approaches to bilingualism, is resonant with Hammer et al.'s (2005) "resource-based view of learning" in which "learning a new idea is not an all-or-nothing acquisition, but involves an activation of existing resources in new combinations" (p. 114). This view from psychology reframes the potential of what appear to be language errors, negative transfer, or interference as positive evidence of writers drawing on multiple, overlapping language resources all at once (see Chapter 2). With affinities to multi-competence, approaches to multilingualism that emphasize a writer's existing languages resources help scholars consider a linguistic repertoire-in-process, with a writer's language particularities acting as a single kaleidoscope of "new configurations" and "new combinations" through which a writer produces the transfer act.

FUTURE FRAMES: TRANSFER AS ORIENTATION

We conclude with a final turn of synthesis. This entire reference guide itself is a synthesis of sorts, and in this conclusion, we have suggested five thematic threads that distill commonalities we found uniquely important across the guide's chapters. Now we offer one last step of distillation, suggesting how the shared qualities of these threads might shape future approaches to researching and teaching for transfer.

Interdependence

First, the themes above—individuality, intentionality, fidelity, directionality, and simultaneity—all share an aspect of interdependence that should be accounted for in future studies of transfer and in future transfer pedagogies. Here, interdependence means the inextricable mutuality of aspects of any transfer situation. Aspects like multiple contexts, processes, or dimensions do not just co-occur, but depend on each other to work. The centripetal energy of each element of transfer brings together aspects that seem contradictory: learners transfer knowledge both deliberately and automatically; the transfer of knowledge occurs with both flexibility and control; concepts are best trans-

ferred when taught through abstract theories and as concrete skills; transfer skills are transportable but also bound to context. For example, interdependence shapes dual processing theory in psychology, in which every individual uses “two different modes of processing” in order to deal with incoming stimuli: “processes that are unconscious, rapid, automatic, and high capacity, and those that are conscious, slow, and deliberative” (Evans 2008, p. 256). But as transfer research stresses over and over again, across fields, such duality is not contradictory, it is complementary. Elements of transfer that stick together can certainly frustrate the need to isolate factors in an empirical study of transfer. But the point of interdependence is that these elements do not simply sit together in the transfer act; they symbiotically shape what shows up as transferred knowledge during research or teaching. They need each other to make transfer legible.

Therefore, when it comes to researching the transfer of writing knowledge, the interdependent nature of transfer should lead writing studies scholars to consider the ways that transfer might be more interwoven among actors—collaborative, interpersonal, embodied—than writing studies’ methods can account for. While long-established approaches—from Giddens’ structuration theories to CHAT methodologies—take at their core the co-genesis of both person and society (Prior, 2018), research on the transfer of writing knowledge especially needs to account for the bound nature of individual and social dynamics. One line of research that skillfully models this tension are studies of the body’s relation to cognition, which traces learning “beyond the mind as a separate entity to include the body and all its senses” (Light, 2008, p. 23). Such research includes LeMesurier’s (2016) studies of embodied rhetorical recognition and response; Nemirovsky’s (2011) embodied cognition theories in psychology; or the teaching games for understanding approach in sports education which “links movement in games with the verbalization of understanding through the embodied conversation that takes place between them” (Light & Fawns, 2003, p. 162). While the body and mind are rarely set in opposition to each other in writing transfer research, they are rarely treated as mutually animating elements of the transfer process. Beyond body-mind connections, future research on transfer will need to be able to trace interdependence more capaciously, perhaps by collecting data beyond individual experiences or enactments of transfer, including transfer data that occur in-process (through observation, think-alouds, longi-

tudinal methods) and in groups (through focus groups, teacher research, or online contexts).

Regarding teaching, interdependence might turn practitioners' focus especially toward the collaborative qualities of transfer. Pedagogical approaches across chapters use simulations, awareness of transfer as content, consciousness of transfer acts on the part of students, and reflection that heightens both of these. One can trace how each of these elements have evolved in writing studies, moving from Beaufort's pedagogy (2007) (explicitly teach for transfer) to Yancey et al. (2014)'s teaching for transfer pedagogy (use reflection to do this work) to writing about writing pedagogies (use writing studies research as the content on which to reflect). But future approaches to teaching for transfer need to account especially for the connections among writers in the classroom. That is, beyond the support of individual students reflecting on and transferring writing knowledge, teaching for transfer should be thought of as a distributed pedagogy, in which transfer happens among students as well as the teacher.

This means that writing activities would be designed for groups of students to become aware of and facilitate each other's transfer, or for students to reflect on their instructor's role in their own transfer activities. Nowacek et al. (2019) and Winzenried et al. (2017) have explored the collaborative dimensions of transfer in peer talk, while Driscoll and Jin (2018) have examined the influence of interview conversations on emerging understandings of transfer. Writing assignments could ask students to examine how a past class, as a specific social context, impacts how they transfer writing knowledge to present contexts. Peer review activities could be reflected on as a collaborative transfer event, asking students to address the interpersonal dimensions of peer feedback. Written feedback could be geared to explicitly discuss how student writers and the instructor will *together* transfer learned writing skills to subsequent assignments. The goal would be to acknowledge in each of these activities the ways that teachers and students depend on each other (are interdependent in meaning-making) in the transfer act.

Ephemerality

The second aspect that all five themes above share is a sense of ephemerality in the study and teaching of transfer. Ephemerality is used here to mean that the transfer phenomenon can be fleeting, hard to grasp, and sometimes occurring without the conscious awareness of a

researcher or writer (e.g., Day & Goldstone, 2011). When researchers look for transfer, they may see only a part. When instructors aim to teach for transfer, they may support only a piece. Considering ephemerality in transfer research and teaching means giving up some control, acknowledging that in its deeply social nature and close affiliation with learning, transfer can be hard to capture and explain in full. An investigative or pedagogical grasp on the phenomenon might be very brief indeed.

Across this book's chapters, ephemerality often appears in limitations sections of research articles, wherein scholars acknowledge that their study design couldn't quite pin down the phenomenon they were after. In research that stresses individuality, intentionality, and fidelity, findings become nuanced when scholars admit that during transfer individuals are connected to others, in contexts that aim to simulate future realities but never really can. Shades of the ephemeral appear in scholarship like Lobato's (2008) work in psychology, which argues that transfer might occur in a study, but it might not result in the expert behaviors that researchers sought to trace. Lobato suggests that researchers, by choosing a particular learned behavior to trace, may miss the transfer phenomena occurring beyond the researchers' delimited gaze. Similarly, in sports education, Light and Fawns (2003) assert that transfer is both verbalized and not verbalized because it occurs on embodied and situated levels that study subjects might not be able to articulate in words. Think-aloud protocols, interviews, and textual analysis might all miss transfer that exists as bodily, less-conscious, or un-verbalized knowledge. For Keith and Frese (2005) in industrial psychology, "errors" in the transfer behavior they set out to trace do not show a lack of transfer but instead build evidence of a "learning device" (p. 677). They suggest that training programs should "allo[w] and encourage[e] errors to occur" (Heimbeck et al., 2003, p. 337) so that learners develop the skills to work with them in new contexts that are always "open, disruptive, and ambiguous" (p. 336).

In researching the transfer of writing knowledge, such ambiguity means that scholars must reconsider what can be realistically captured by the methods at their disposal. They may need to present analysis and findings with less certainty, being honest about what parts of the transfer of writing were not fully grasped. The role of ephemerality in teaching for transfer might simply be reassuring. Experienced teachers

know how much variability and uncertainty is involved in even the grandest of our pedagogical plans.

Orientation

The interdependent and ephemeral qualities of transfer leave researchers and teachers with a bit of a conundrum: it is not necessarily an actionable conclusion that the transfer of writing is too interwoven or fickle to study or teach. We acknowledge that it may not be satisfying to read that pulling out a transfer thread simply unravels transfer's fabric. So, we propose that accounting for orientation in the transfer of writing—on the part of the writer, instructor, and context—might mitigate some of its sticky and slippery qualities.

Brandt (2018) notes that early childhood writing experiences can develop into productive “orientations to writing” (p. 265) that, when combined with later school and workplace practices, eventually become “incorporated into a person's more general dispositions toward life” (p. 266). This forces “an expansion of what is considered transfer in writing,” one that sees current orientations to writing through the prism of a lifetime of writing experiences (p. 265). Donahue (2016) defines orientation as “the fundamental cognitive activity” of transfer which is characterized by a “fluidity and anti-determinism” that reminds scholars that “pre-orientation is not pre-direction” (p. 118). In Donahue's terms, orientation unites transfer's cognitive work with the fluidity of social experience: writers accumulate lived knowledge that orients them to the possibilities of writing without determining where, when, or how they will use that knowledge. She explains that because “every learner, every language-user, every writer is pre-oriented by past experiences; every learner can engage in orientation and can recognize his or her orientation” (p. 118). Her repetition of “every” stresses a kind of democratic access to the engaged awareness of being oriented; everyone is both conditioned by past experiences with writing but not limited by them. Following Brandt and Donahue then, orientation places fleeting transfer activity into the durability of transfer occurring across all lives. As Donahue (2016) and others have noted, how something transfers is not the same as what is being transferred—the knowledge itself (the what) is distinct from the nature of its transformation (the how). But orientation unites the what with the how, suggesting that the knowledge that moves affects the shape, direction, or consequences of transfer as it occurs. A transfer act is a realm of pos-

sibilities, inclusive of the ways a writer is pulled to apply knowledge, and how they knowingly respond to or resist those tugs.

Orientation provides an architecture for those possibilities, incorporating the interdependent material, sociocultural, and embodied dimensions that condition how writers move their knowledge. Orientation also provides multiple viewpoints into transfer attempts: the teacher's, the writer's, the peer's. Orientation leads us to consider what part of the transfer act we are looking at from which or whose point of view and why. It necessitates including how those views are shaped by the power relations of classed, gendered, racialized positions, leading researchers and teachers to become conscious of their own transfer gaze and aware of which transfer acts they have decided are legible or illegible. Our charge as a field moving forward might be to best determine how to *use* writing to articulate a schema accurate to the experience *of* writing: that interdependence and ephemerality are not qualities that trouble or derail the smooth transfer of writing, but instead are qualities, forged in the activity of lived experience, that remind us what writing always is.

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