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The atomic bombing marked an end to World War II and triggered the evacuation of the Japanese from the Korean peninsula. In its wake came parallel occupations by the USSR and the US, under which North and South Korea dedicated themselves to rebuilding from postwar destruction. Science and technology had a central role to play as the means through which to meet economic goals and achieve military, political, and social ideals. In North Korea, the investment in science and technology revealed itself in young reader magazines, where scientific content made banal the exceptional power of nuclear energy and made the natural world knowable through formulas and data. At the same time, science and fiction took an interest in the relationships between the self and the collective and between humans and nature and reconfigured these relationships in moral terms. This article argues that scientific knowledge had to be framed by, and injected with, strong moral guidance to assure accurate and appropriate applications of the technical and scientific. Moral restructuring was the ground zero of social and economic reform, and the narrative form was recognized as the best way to shape the most elusive frontier of all: the fantasy of the young.

Keywords: science, youth, narrative, morality, North Korea

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INTRODUCTION

The atomic bombings of Japan were watershed events of both regional and global proportions. Hiroshima and Nagasaki were obliterated, taking more than two hundred thousand lives, among whom were approximately forty-five thousand ethnic Korean residents.[1] The bombings marked the end of the Pacific War and signaled the swift evacuation of Japan from the Korean peninsula. They also made clear the stakes of the Cold War by providing a taste of the terrifying new power of science and technology and made more urgent the need for amassing nuclear weapons to protect against hostile powers. The arms race was on, and none could afford to be left behind.

A budding nation seeking to rebuild its infrastructure and social institutions from the rubble up, the Democratic People's Republic of Korea (henceforth North Korea) pinned many of its hopes for a swift recovery on its engineers and scientists. Ambitious production goals could be set and a vision of the future could be touted, but absent the necessary skills to turn these visions into reality, such goals were meaningless. To this end, the new government worked quickly to eradicate illiteracy,[2] establish a compulsory education system,[3] and cultivate institutions of higher learning.[4] In addition, the injection of foreign capital from socialist countries was instrumental to North Korea's postwar development of science and technology, as was the integration of experienced scientists from abroad, including those from South Korea.[5] The Soviet-inspired Kwahagwŏn, or Academy of Sciences (Chosŏn Minjujuŭi Inmin Konghwaguk Kwahagwŏn), was established in 1952. Comprising North Korea's top scientists, the Kwahagwŏn was to "insure the speedy development of science and technology, to unify the science research activities, and provide guidance and organization in a planned manner."[6]

While high-skilled technicians and scientists were critical to North Korea in this period, equally important was the investment in the ideological education of North Korea's youth, the future generations and citizens-in-the-making. Quoted by the compilers of a 1955 retrospective on a decade of education in North Korea, Kim Il Sung remarked:

> Youth must be taught democratic ideologies [*minjujuŭi sasang*] that instill love for country and compatriots, and youth must be armed with advanced scientific theories [*kwahakchŏk sŏnjin iron*] as the only means through which the next generations will be educated in the difficulties and struggles so that they will be cultivated into champions of the new nation. . . .
>
> Our education must arm the next generation with a scientific worldview [*kwahakchŏk segyegwan*], and cultivate these through refined moral values [*kosanghan todŏkchŏk p'umsŏng*] and cultural actions [*munhwajŏk haengdong*] and in this way raise a patriotic people who will fight for the development of society. The remaining tasks for our liberated land include rebuilding and expanding the work of education, cultivating and expanding the number of technicians [*kisul injae*], improving educational content, and quickly developing our culture [*minjok munhwa*] and science [*kwahak*].[7]

As this quote makes clear, postliberation education in North Korea focused on ideology (*sasang*), science and technology (*kwahak kisul*), and culture (*minjok munhwa*). These three components remain deliberately vague so as to be as broad as possible. At the same time, the phrase "scientific worldview" evokes dialectic materialism, serving as a reminder that at its foundation, North Korea's Marxist ideology saw itself as scientific in methodology and in its systematic analysis of the material and social world.

The observation that the scientific and the ideological were merged in rhetoric is not, in and of itself, unique to North Korea. Aaron Stephen Moore finds that technology was invested with ideological meaning and vision throughout twentieth-century Japan.[8] Judith Shapiro shows how Mao's belief that man must conquer nature drove his devastating, large-scale projects.[9] Ethan Pollock demonstrates that Stalin was invested in biology, linguistics, physiology, and political economy as symbolic weapons of the Soviet battle with the West along an "ideological front."[10] Moreover, John Krige argues that "science was embedded in, and instrumentalized for, the projection of American power in postwar continental Europe."[11] These are but a few of many instances that demonstrate the extent to which the "scientific" and "technological" have been motivated by ideological convictions and mobilized to legitimize them.

In this sense, the extent to which North Korea's scientific and technological mission was ideologically driven is not remarkable. Yet it begs iteration, at the cost of stating the obvious, that the ideological *is* the moral. Ideology, drawing on Terry Eagleton, is in its broadest terms a set of conscious and unconscious political beliefs that are produced and reinforced symbolically and that help preserve the power and dominance of certain interest groups.[12] But it is inherently normative, meaning that ideology establishes behavioral norms and guides the way social actors make sense of their world and, for example, discern between good and evil.[13] As scholars have noted, North Korean ideology that was developing in the 1950s and 1960s corresponded to economic, social, and political theories that later became what is known as *juche*, or self-reliance: a "discursive platform that sustains the link between the world, beings, things, and phenomena."[14] North Korea's ideological brand, as Charles Armstrong has observed, can be viewed as "moral exhortation"—truth-claims that frame the ideological as normative and that are then produced and propagated by social institutions and modes of mass culture.[15]

This article explores the relationship between ideological and moral content in science and general-interest magazines for North Korean youth. Drawing our attention to the aforementioned educational goal of producing "refined moral values," I make the following three arguments: First, I take note of the manner in which scientific and ideological content came to acquire a moral cadence in youth magazines published in the 1950s and 1960s. I argue that the moral landscaping of youth was seen as vital to North Korea's future[16] and that science and general-interest magazines were useful tools for teaching morality and restructuring

two important relationships—youth and nature, youth and community—in moral terms. Second, I argue that the moment science moves through language and is organized in textual and visual narrative is the moment science becomes both rhetorically potent and potentially volatile. Lastly, I argue that the potential volatility of science was most apparent in the realm of the youthful mind or fantasy, and it was therefore the most elusive—and in most urgent need of restructuring. It was not the language of political ideology but the logic of morality that was invoked in order to secure a scientific, political, and social utopia.

MAKING SCIENCE MORAL

> "As history has shown us, science is a double-edged sword. It can bring happiness and wealth to some and devastation to others. The experience of development in the socialist Soviet Union shows that only in truly democratic countries can science contribute to the progress of humanity; Hitler and the ruling class of the United States [demonstrate that] science in the wrong hands can cause oppression and bring about the destruction of mankind."[17]

In an essay titled "For the Development of North Korean Science," Kim Kyusŏp argues that science facilitates human control over nature and thus bring about the material conditions necessary for a good life. But science, he points out, can be equally mobilized by the powers of evil, and therefore it is critical that science be driven by the right ideology. The Soviets model this perfectly: "Soviet science is a scientific and creative dialectic materialism that is founded on the worldview of the people [*inmindŭl ŭi segyegwan*]. . . . [It] mobilizes the resources of society and nature for the victory and prosperity of its people."[18] Even in the short time since liberation, the author observes, North Korea has already produced many fine scientists among its ranks. But more needs to be done to turn science into public culture. School is not enough: literature, film, theater, art, and a variety of institutions must connect people's lives with science. That connection is what will boost the country's development and production and will spread happiness among the people of North Korea.[19]

Published in the magazine *Kwahak segye* (*World of Science*),[20] this essay expressed two positions that were sustained in literary and scientific magazines geared at young readers for the following two decades. The first was the position that science was a body of knowledge from which the Korean people had been excluded by the colonial regime. Now that North Korea was liberated, it was critical that this knowledge be accessible to all through literature, film, theater, and art (what Heonik Kwon and Byung-Ho Chung call the "technologies of mobilization").[21] This position placed the responsibility of disseminating information about science in the hands of print and visual media, whose job it was to turn the specialized knowledge about science into applicable know-how (*chisik*) and common sense (*sangsik*). One

term that was commonly used was *soyu*, or possession—science magazines would help their readers "own" the knowledge that had previously been kept from them. From nuclear power to solar eclipses, the role of print media was to render, to borrow Gabrielle Hecht's terms, the "exceptional" into the "banal."[22]

The second position taken by science and literary magazines was that science in and of itself had no moral value. Scientific knowledge was not inherently good or evil. Data did not lie, but it was the way numbers were manipulated that made science a "double-edged sword." For this reason, science had to be guided by the right ideological worldview and morals and framed aesthetically in order to assure that science and technology would deliver the "right" kind of progress: one shared by the collective and that would advance the economic and social projects being engineered by the new government. Only then would science fulfill its calling, which was to bring about collective prosperity by conquering and reforming nature.

The response to the imperative to propagate science was provided by the magazines for young readers published in postliberation North Korea.[23] Science—in the broadest possible terms, including natural and social science—was to be read, circulated, and discussed both in the home and in the youth and children's communities to which young people belonged. Magazines such as *Kwahak segye* and *Sonyŏn kwahak* (*Youth Science*) included genres such as pedagogical essays, cartoons, home experiments, and science fiction to give a varied face to scientific information, one that was equal parts informative, aspirational, entertaining, and practical. Other magazines, characterized by a broader range of interests, such as *Sonyŏndan* (*Scouts*) and *Sae sedae* (*New Generation*) for older readers and *Adong munhak* (*Children's Literature*) for younger ones, included essays about young scientists, home engineering projects, and science fiction, both original and translated from the Russian. *Sonyŏndan* and *Sae sedae* also included monthly quizzes in the back of each issue that challenged children's ability to put their learning to use with examples from daily life. With such a variety of offerings aimed at boys and girls, the magazines made an effort to draw in their readers and make science a regular staple. In the postliberation science magazines of North Korea, there was something for everyone.

While they differed according to their intended audience in the complexity of detail, number of illustrations, and overall tone, what these magazines shared was an attempt to turn the specialized knowledge of science into common sense. *Kwahak segye*, for example, had monthly features titled "Science and Everyday Life," "Science as Hobby," "Science Is Power," and "Scientists' Biographies." In an essay titled "Hopes for the New Year for the *World of Science*," Paek Kwang writes that the magazine should protect readers from being infected by American propaganda and its false "atomic diplomacy" by revealing the secrets of atomic energy.[24] "A Chunk of Common Sense," for example, was a regular feature in *Kwahak segye* and *Sonyŏn kwahak* that explained social and scientific phenomena

("On White and Black Smoke";[25] "Our Working Mothers and Sisters"[26]). The purpose of these features was to introduce science less as a theoretical engagement and more as a practical skill that could be taken up by anyone anywhere, thereby dispelling the mystery that shrouded the natural and social world. Other regular sections, titled "Study Hour," "The Young Scientist," and "Engineering Corner," offered ideas about how to turn private home spaces into makeshift laboratories.

These magazines share the way in which the language of morality permeates scientific content. Physics, chemistry, biology, earth sciences—all had to be folded into a new way of viewing the world, whose moral contours defined its ideological character. For example, in the essay, "Let Us Raise the Flag of Science and Move Forward!," the noun *science* is modified by the adjective *true* (*ch'amdaun*): "Above all, we must first study true science in a profound way and devote all our energy to learning it."[27] Here, the author is not referring to a particular discipline of science but rather to an approach to science that involves observation for the sake of uncovering the laws of nature that will lead to social and economic development for the benefit of all. The essay contrasts this practice of science with its practice in South Korea, where science is studied for its own sake (*maengmokchŏk*), is described as unsystematic (*uyŏnjŏk*), and is driven by personal fantasy (*kongsang*) and ambition (*t'amyok*) or by superstition (*misin*) and spirits (*kwisin*).[28] These terms are used to make a moral argument and to draw the line between the study of science for good and for evil. The North Korean brand of science is called elsewhere the "sincere science" (*chinjŏnghan kwahak*) that must be practiced with sincere attitude (*chinjŏnghan t'aedo*) and tenacity (*kanginsŏng*) so as to move past the colonial legacies of exploitation.[29] And while sincerity and tenacity are crucial, equally important to the proper practice of science is "refined patriotic ideology." The frequently used term *kosang*, or refined, functions here both as an aesthetic and as a moral one: it indexes a sophisticated understanding of social relations and an unwavering and noble commitment to advanced science that will bring about equal development.[30]

Even when walking the young reader through scientific experiments, the language of the articles straddles the aesthetic and moral. In an essay written by students from a sixth grade class, an experiment made to measure the volume taken up by air is described as "carefully" conducted, its results leading not only to a sharper understanding of science but to a "deep revelation."[31] And when Kim Il Sung visited an exemplary student biology circle (*k'ŭru syok'ŭ*), he provided them the kind of instruction that would cultivate them as "sound, sturdy, bright, and cultured children," to which the children responded with "one heart, a collective sense of purpose."[32] The word choices in these articles point to a synthesis of information represented by formulas and numbers with a social and spiritual stance that defines what it means to be good in the world (and its antithesis across the border). The rhetorical devices used in the phrasing of the essays also made for a direct address from narrator to reader. Sentences end in "we must do" or "mustn't we all?" and begin with "Of course, I believe it to be true that . . . ,"

as in: "Did you forget the material you learned in the first semester? Or were you lazy in completing the homework assigned to you by your teacher? Or did you stay home or were you tardy because it was a little cold? Of course, I believe that none such incidents ever occurred."[33] Such uncompromising language, sealed in the sustained honorifics and the certainty of the verb endings, left no room for ambiguity.

Morality was understood as "a set of life norms [*saenghwal kyubŏm*] that instructs us on how to behave in the social world." Contrasted with capitalist morals, North Korean morality was said to have developed out of "a sense of alliance and solidarity, mutual aid and loyalty to the Party, strict adherence to regulation and discipline, and courage."[34] Magazines tasked with communicating and shaping the moral landscape of young readers did so not only on the level of language but also through form and content. Science and general interest magazines were particularly useful for teaching morality and, more specifically, in restructuring two important relationships in moral terms: youth and nature and youth and community.

The restructuring of the relationship between the individual and the collective in moral terms took place in the magazines of the 1950s. In the mid-1950s, essays such as "On What Is 'Mine' and What Is 'Ours'"[35] reported on positive and negative behaviors observed in schools. The act of fixing a stepping plank that had come out of place was defined as "beautiful" and the young man who fixed it as a "true" human being (*ch'amdoen saram*) because he was working for the benefit of the people (*inmin*) and the collective (*chiptan*). By contrast, a student who picked flowers from a communal garden to make his desk look nice is condemned for viewing the shared property as his own and for placing his personal desires over those of the collective.[36] Reinforcement of such messages came in cartoon form starting in February 1956 with the section titled "Mangwŏn'gyŏng pudae," or "Binocular Corps," as follows:

> The Binocular Corps of *Sae sedae* is going to seek you out. The members of this corps include photographers, artists, and also a respectable grandfather.
>
> At times you may be asked to join us.
>
> We will be capturing pictures of good and bad behavior and publishing them here.[37]

The "binocular corps" section came in sets of contrasting images (figure 1). The left image showed positive behavior, such as clean-cut attire, concentrated study, orderly conduct, appropriate behavior, diligence, and care for children and the elderly. To the right of each "correct" model was a contrasting negative model, such as inattentiveness to the needs of the group and lack of respect for order. These negative examples were expressed visually with frenetic, curved lines that transgressed and disrupted the geometric space. Additionally, each set of binocular-framed images was framed by a caption that called attention to the behavior under scrutiny. They narrated desirable behavior in terms of the individual's relationship with the physical space and with the community around them.

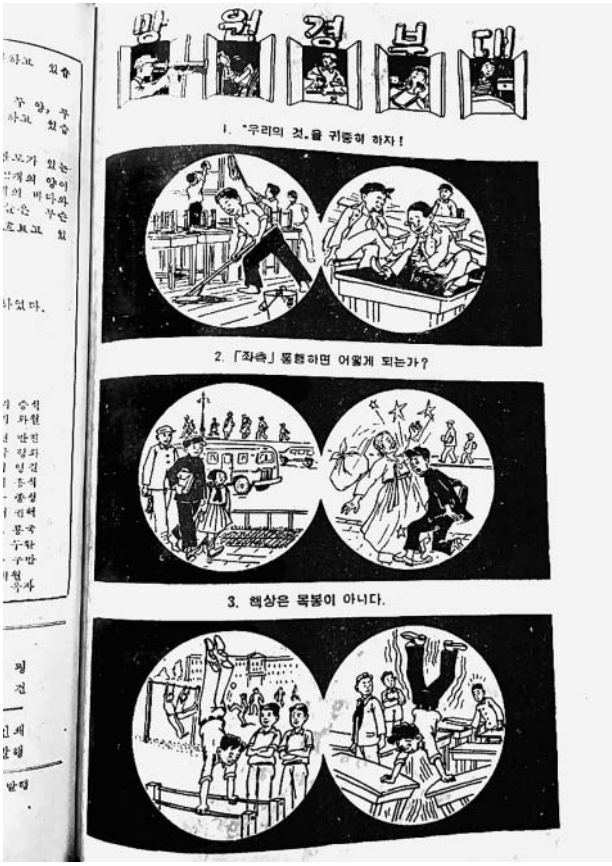


Figure 1. "Binocular Corps" (*Sae sedae*, March 1956, back cover)

Social violations were explained in moral terms, or as *todŏkchŏk p'umsŏng* in later issues. Moral behavior included sincere and polite behavior, maintenance of personal hygiene, sustaining the beauty of the Korean language by eradicating dialect and offensive speech, keeping promises, and appreciating the natural world and works of art. Negative behavior included smoking, drinking, playing games, disparaging women, ill-mannered behavior toward children, fighting, and damaging public property.[38] The abstractions described in this essay returned in concrete examples in a series that began in August 1958 titled "Socialist Values."[39] In a series of six consecutive issues, students submitted letters that identified their comrades by name, class, and school and condemned transgressive, immoral behavior. Such behavior encompassed rowdiness in public places and not giving up seats for the elderly; smoking, drinking, and using South Korean kinship terms; working for one's personal benefit; working out of a sense of duty

instead of personal conviction (*sinnyŏm*); entertaining selfish interests; harboring distaste for collective life; being overly passive; disrespecting public property; egotism; obsessing over personal freedom; jealousy, betrayal, arrogance, flattery, transgression, immodesty, familism, and regionalism;[40] foul language and superficiality;[41] and shirking one's duties.[42] Worst was the cardinal sin of selfishness, the disease noted as most commonly afflicting North Korean youth.[43]

What implications did such moral reconfiguration have for science? The phrase "red engineer" that emerges in the magazines refers to an engagement with science and technology founded on a thorough understanding of socialist ideology and motivated by a desire for progress that will benefit society as a whole, not the individual scientist or elite group.[44] Science should be driven by the economic and social needs of the collective, and Soviet science was lauded for the way the *kolkhoz*, or collective farms, worked for the benefit of the region.[45] The moral character of science, or "kwahak ŭi p'umsŏng,"[46] was to make daily lives so efficient that people would spend their time being cultured, exercising, and cultivating their *sinsim*, the true self.[47]

The reconfiguration of the moral landscape that was to drive social engagements and scientific research also entailed a new relationship between the individual and the environment. The phrases in this period, inspired by the grandiose projects taken by the Soviets and Chinese, were "conquering of the universe" and "grand reform of nature." These phrases evoked man's command over nature and humanity's obligation to manipulate the natural environment in order to provide for the population. The Soviet plan to redirect their river flows was described as "the best use of science and technology for the reform of nature, which ideologically is humanity's first priority and task."[48] In particular, the development of nuclear power carried the promise of unlimited energy along with innovations in medicine, farming, and engineering. As the assistant deputy director of the Science Academy put it, "[North Korea's] task is to use atomic energy for peaceful purposes so as to bring about prosperity, happiness, and world peace."[49]

The hopes for North Korea's prosperity were pinned on scientific development and the ideological shaping of its youth, and print media proved an effective place to pair the two. Science and technology were mobilized to reform the relationship between youth and the natural environment and between youth and their community. These reforms promised not only material prosperity but also happiness—happiness that hinged on a new moral subjectivity.[50]

THE STORY OF DATA: SCIENCE IN FORM AND CONTENT

Science proved a useful tool to enact a moral reconfiguration of young readers, but this reformation was implemented through narrative. By narrative, I refer to the representation of events in written language, or "what results from the effort

to make real or imagined events and objects meaningful in relation to one another, whether that effort is fictional, historical, political, financial, psychological, social, or scientific."[51] Narrative theory is that which concerns itself with the relationship between an event (story) and the representation of that event in language (discourse). Attention to the tension between the two illuminates the relationship between events that occur and the "more or less motivated schemes that we impose onto those experiences in order to give them sense, direction, hope, and meaning."[52]

In the case of science writing, an interrogation of narrative practices presents a particular challenge because of the assumption that scientific content is that which is stripped of ambiguity and "linguistic energy," does not use words for their "suasive use,"[53] and somehow "eschews rhetoric."[54] But as interrogations of science and literature have shown, scientific work represented in language can be seen to have "assumptions that are culturally constituted, maintained, and preserved";[55] science does not, in fact, remain intact when it passes through language.[56] Beer notes that the scientific paper "claims an authoritative retrospect towards the knowledge it produces"[57] but that it reveals its motivations—its narrativity—in the "ordering" and in "disarrangements" and in the very mechanisms of imposed order that narrative theory seeks to illuminate.[58] Scientific writing aspires to be neutral, to remove any trace of the author, to claim significance only with respect to its subject matter.[59] Scientists report what they believed to have occurred, but they work through language and through their experiences, where "the curves have been artificially smoothed, the equations are merely approximate, and the laws hold only in some ideal Newtonian universe."[60] In general, scientists work on three assumptions: that there is an objective, real world; that in some absolute sense this world becomes "known" to scientists through their efforts; and that what they "know" comes then to be translated into, and represented as, language.[61] David M. Locke challenges these assumptions and notes that representation "is not . . . a verbal image of an external, pre-existent real but rather a conventionalized formulation of a contextualized, conceptualized 'real,' a re-presentaion of a concept, not a representation of a real."[62]

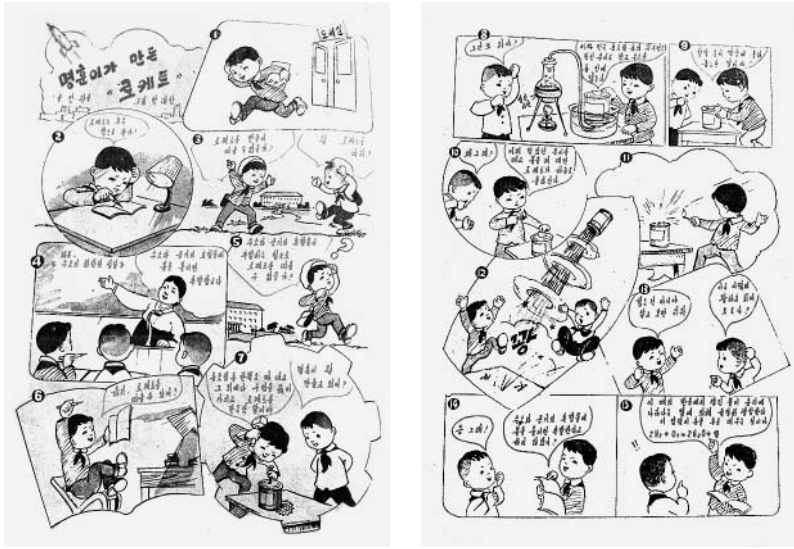
Interrogations of scientific content as represented in language bring into relief the narrative devices whose purpose is to communicate crucial scientific information as well as political and social truths about the natural world in moral terms. Narrative devices such as time, levels and voices, and speech representations blur the boundaries between information and interpretation. In this section, I apply narrative analysis to fiction and nonfiction works. My interest is in the ways in which the narrative devices work to represent an objective, scientific reality, and my application of literary analysis to scientific and science-fiction texts demonstrates the stakes of moral reformation in 1950s North Korea. Applying the same methodological approach to fictional and nonfictional narratives is not without challenges. One difference between the two genres is that fiction does not disavow its fabricated

origins, while nonfiction discourse is assumed to be stripped of "linguistic energy." Yet placing the two types of narratives side by side and applying discourse analysis to both affords us a view of their shared narrative qualities and furthermore illuminates the moral origins of scientific writing in this period.

Time, as Shlomith Rimmon-Kenan explains, is a constituent factor of narrative. By time, she refers to the events in a story that unfold within a structure of "temporal succession and causality."[63] This is the notion of story-time: that stories have a chronology, a progression from beginning to end whose interaction with "natural chronology" breeds a productive tension.[64] It is in moments where story-time is disrupted through temporal shifts such as flashbacks (analepses) and foreshadowing (prolepses) that the text's narrativity, its existence as a representation of events in written language, makes itself known.

Take, for example, the two-page essay "Pyŏ" ("Rice Stalk"). Penned by "the editors," the essay is told from the first-person perspective of the plant: "I am a rice stalk. I ripen in the soil of the gilded rice fields of Chosŏn with my brothers where we dance and sing and grow." The essay explains the process of rice harvest, and it ends with the call for efficient production of food. However, the plant twice reaches into the past: first to explain that long ago the rice paddies were neglected and treated as weeds until wise men of the "prosperous land of clear morning" noticed them. Next, the narrator reflects on the days when the Japanese placed their "dirty feet" in the soil and shipped off Korea's grain, and on present-day South Korea, which suffers even worse abuses. These brief allusions into the past and parallel universes in the present (South Korea) allow the narrator to add historical content that does not have direct bearing on the subject matter (ideal conditions for rice growing). The painful past (*momsŏri nanŭn iyagi*) explains the need for the "sounds of tractors," for automation and "chemicalization" of the land. It ends with the proclamation: "We must repay the sincerity of the farmers working with their hearts to increase production to fulfill the wishes of the Party."[65] In this moral economy, the sincerity of the farmers makes possible the acquisition of technical skills that will bring glory to the nation.

Another use of time appears in the form of future travel. "Ch'ŏri wa Ogi" is an eight-panel cartoon in which a boy and girl travel to the "farming world of the future." They get a bird's-eye view of tractors spraying pesticides and pulling weeds, monstrous radishes, fast-growing mammoth trees, and corpulent livestock, all made possible by the gift of chemicals (*yak*). When it is time to return, they excitedly anticipate being able to report the happy news to their comrades. Interestingly, Ch'ŏri is less impressed by what he sees on this journey because he has "read all about it in his science books."[66] Travel into the future has enabled the children to witness the miracles of agricultural development, but the story-time returns the reader to the present, where all of this progress has been predicted in Chŏri's books. The moral imperative here is a stance of optimism and an attitude of tempered wonder: the glorious future should not surprise the reader, because it has been laid out in the books of the present.



Figures 2–3. "The Rocket Made by Myŏnghun" (*Sonyŏn kwahak*, August 1965, 10–11)

Lastly, the linearity of narrative—its layout on the page in the form of a beginning, middle, and end, imposes a structure that mimics the logic of the scientific method of observation, measurement, and experiment as well as the formulation, testing, and modification of the hypothesis. Take, for example, the fifteen-panel cartoon "Myŏnghuni ka mandŭn rok'et'ŭ" ("The Rocket Made by Myŏnghun") (figures 2–3). This cartoon proceeds in numerical order from the excited moment when Myŏnghun makes a hypothesis based on his research from a book in the library to the successful launching of a homemade rocket that confirms the proper understanding of the chemical principles of combustion.[67] The cartoon is a teaching device—it illustrates the steps for launching a rocket and the simple tools necessary for its construction—but it also illustrates desirable qualities, the ideal manner in which learning should take place: it starts with a scientifically based idea, is fueled by self-motivated study and shared with classmates, is supported in the classroom by smiling teachers, and culminates with a successful experiment that follows the scientific formula and thereby proves its soundness.[68] The form of this cartoon—numbered panels that share space on the page but that make sense only if they are read in the proper order—mimics its content, which illustrates how curiosity, academic diligence, optimism, and confidence in the scientific principles can lead to only one result.

Another analytic tool used to understand narrative complexity is the examination of the typology of narrators—the extent to which narrative levels and voices participate in the story.[69] One of the most common uses of this device shows itself

in anthropomorphic representations of the inanimate world. A mechanism used frequently in content for younger readers, the anthropomorphizing of rice stalks noted earlier provides an opportunity to narrate a history of exploitation and the current scientific triumph, all delivered in the rice stalk's "own words," lending the narrative a confessional, and thus a more truthful, quality.[70] Another example is "Magic of Coal," told in forty illustrated panels.[71] The uses of coal are introduced through the coal character who narrates the description of the multiple uses of itself in glue, vinalon, nylon, gasoline, and perfume.[72] The story of coal is told in the first person, which has the effect of compelling younger readers to identify with the anthropomorphic character, thus more easily delivering the moral lesson about the importance of careful storage and transportation of coal to assure its maximum benefits. Other first-person narratives come in the form of letters from readers. For example, a middle school child extends her gratitude to the magazine *Sonyŏn kwahak* for its useful diagrams and the lessons on model building. In her letter, she admits to failure and to feelings of intense frustration, but she also shares the triumph that she experienced after she tried different experiments that led to a successful model-boat launch.[73] Another student thanks the magazine, writing, "I have been reading *Kwahak segye* since the very first volume. It is a tremendous resource for young people wanting to learn more about science. We can't survive without modern science. I hope to continue to see such interesting, educational texts."[74] Such confessions and heartfelt appeals served both to affirm the mission of the magazines (by presenting bona fide, reliable narrators) and to generate models of moral behavior, tenacity, and persistence in the face of adversity and evocation of the colonial past.

Lastly, speech representation in narrative theory includes two broad categories: that which is a direct presentation of events and conversations and that which is presented through the mediation of a narrator.[75] Tracking the types of speech presentations in the text, from "diegetic summary" ("the bare report that a speech act has occurred, without any specification of what was said or how it was said") to "free direct discourse" ("shorn of its conventional orthographic cues"),[76] illuminates places where the text inserts political or moral insights as seamless, organic parts of the text so that they do not call attention to their moralizing function. The essay "Travel to the Universe" reports on the satellites Vostok 3 and 4 launched by the Soviets in 1962. It details the experience of the pilots, describes their daily routines, conveys their personal greetings to all socialist nations, and ends with the note that with this double launch, the Soviets have decidedly left the Americans "in the dust" (*kkamadŭkhage ttŏlguŏ noatta*).[77] The choice of words, "dropped" or "completely shaken off," conveys a confidence in Soviet superiority. Similarly, an essay on the history of chemistry, "Hwahak ŭi palchŏn,"[78] explains how, historically, humans have had access to natural materials, but it is only with modern science that synthetic materials began to be produced and people became clothed and fed more effectively. The essay details upcoming developments in agriculture, medicine, and food science, and ends by asking: "Who among you comrades living happily

in the bosom of the Party will be the first to unlock the secrets [of the future of chemistry]?" While the focus of the essay is on the practical advances of chemistry, the final question returns the implied reader to consideration of the party that has made prosperity possible.

Science fiction narratives published in science magazines also offer insight into the ways that multiple speech representations integrated moralistic and political content. The science fiction story "Space Weather Station" tells of the space travel of three young students guided by the engineer and space station director, O Hyŏnggil. In what is their first time in space, the children marvel at the loss of gravity and learn about the purpose of the spinning space station; the origins of wind; and the weather-controlling mirrors on the space station. The story proceeds through an exchange between the children and their teacher, in which the children contemplate ideas (the installation of giant mirrors on helicopters in order to manipulate the sun's energy, thereby controlling the weather) that are then negotiated with the instructor, who explains that their idea is "scientific" to a point and imaginative, certainly, but that it lacks real data and understanding of how the world works. He tells them: "Our scientists are on the path of the conquest of the universe, supported and inspired by the endless generosity of the Party, and with the confidence that they will be able to overcome the power of nature." This statement is made in the voice of the instructor, its optimism locating their experience within the broader national ambition to exert control over the natural world. The children get an opportunity to witness the use of the mirrors in the prevention of an incoming flood that is threatening the Korean peninsula. The story's narration shifts among the children, the instructor, and the narrator, who has a limited third-person perspective on the characters. But in the closing of this story, the narrator breaks from his limited perspective to make the following observations:

> The children cheered and shouted for joy. The instructor smiled with satisfaction.
>
> This kind of victory does not happen on its own.
>
> All of human wisdom and justice is only made possible by a society that supports the promotion of the welfare of the people.
>
> The instructor exited. The children followed in his steps, feeling uplifted, dreaming about the wonderful things yet to come.[79]

The narrator frames the power just witnessed in terms of the political and social structures but returns in the final line to close the curtain on the story by providing a glimpse into the children's aspirations that have been inspired by the awesome power of science.

Science fiction presented writers with the best tools—time, voice, and speech representations—with which to bring together scientific information and moral lessons. In "The Flying Boat,"[80] Hunil, a young boy nicknamed "little scientist" by his classmates, is known as a dreamer by some of his skeptical friends. The son

of a fisherman, Hunil comes up with an idea that his friends consider a flight of fancy—a flying boat that can suck up fish from the ocean. His classmate Tŏkpo is a particularly strong critic of Hunil's idea. Hunil writes of his idea to his uncle, who is a member of the Science Academy. A response comes within a few days: as it turns out, his uncle has already thought of the idea, designed the prototype, and will test it, and both Hunil and his skeptical friend are invited along. The experiment turns into a little adventure when they are met by inclement weather, but Hunil's confidence in the craft helps him weather the storm, and his return is greeted by cheering comrades. The story presents an opportunity to explore several scientific principles, including Newton's third law of exertion, as well as the different materials making up the complex and surprisingly light body of the flying ship. Equally important, however, are the behaviors modeled by the characters. Hunil is a visionary: a child filled with curiosity and original ideas, who is undeterred by skepticism and who seeks out the advice of professionals. More importantly, when faced with adversity, Hunil is imaginative, optimistic, and careful; Tŏkpo, by contrast, is dismissive, careless, and arrogant. Later, Tŏkpo learns his lesson and reflects: "The power of science is great, indeed! I will make a greater effort in modeling good behavior from now on. Hunil truly has the heart of a researcher."[81] In this way, the structure of this story affords the narrative a number of opportunities to bring together science and a correct moral stance. The story's broader arc shows how certain principles can be applied to make important activities like fishing more efficient. Also, the characterization and the speech representations model both desirable moral qualities—optimism, imagination, belief in the power of science—and negative ones. Scientific content is delivered through narrative to teach lessons both scientific and moral about the real world.

Yi Wŏnu, one of North Korea's most important literary critics and activists in the field of children's literature, reflected on the connection between science and literature as early as 1955. In an essay titled "How to Write Well," Yi proposes to explain the principles of good writing to his young readers with the metaphor of five "keys," each of which unlocks a secret. Four of the five keys are practical: how to choose a theme (write what you know); genre (fiction or nonfiction); how to best prepare for the task of writing (have a palate of words, "beautiful" and "standard"); and how to make good language choices (choose words from your own vocabulary, not from those used by grown-ups). But the first of the five is a moral one that precedes putting pen to paper: namely, the approach to writing with an authentic (*ch'amdaum*) state of mind. This is not an abstract state of mind but one that results from an operation of the senses (seeing, hearing, and feeling), and is followed by proper judgment. The word for proper is *olt'a*, or morally correct. Proper judgment should be followed by living "beautifully," an aesthetic category that stands in for a moral one, since living beautifully involves "good observation, good listening, extra effort to feel, and better judgement." Yi goes on to describe what this means in more concrete terms: studying hard, treating collective property with love, following rules, making loving effort, respecting elders, and loving comrades. That Yi chooses to explain writing using a moral

(proper) and aesthetic (living beautifully) stance demonstrates the hierarchy of importance of morality vis-à-vis the writing process. While much of Yi's argument is focused on drawing content from "real life," he draws together content and the moral state. As an example, Yi extols a sample text in which a child observing his father's struggle with his heavy burden rushes to help him. "Whoever wrote this," writes Yi, "is clearly a very respectful, patriotic, and strong young man. If you practice writing well, you will become better people."[82]

What happens when science passes through language, when scientific content is presented in narrative form? The process of embedding science in writing, both fictional and nonfictional, imposes a moral stance that was central to North Korea's nascent identity in the 1950s. Without science and technology, material recuperation was not possible, and without material progress the social and political project would fail. It was in the narratives of magazines for young North Korean readers that the scientific and the moral could be brought together. However, the power of language in narrative form to shape the moral landscape of young readers was also what rendered it volatile. This was because language opened itself to interpretation but also because there was a space into which language did not have access: the space of the mind, the field of imagination, or *kongsang*. The frontier of the imagination was the ultimate target for moral and scientific narratives because it proved both the site of greatest hope and the site of greatest anxiety. For science and morality to be effective, young people's imagination had to be primed and guided.

FANTASY: THE FINAL FRONTIER

> As the protagonists of the *Ch'ŏllima* generation, students must dream big about the goals of tomorrow! Spread the wings of fantasy, get in step with the new generation of space travelers, and together take an active role on the stage of science and creativity!
>
> —Yi Kiyŏng, "Spread the Wings of Fantasy"

> Fantasy pours out of your lives and drives you down the path of science. I urge you comrades to take your beautiful and admirable fantasies, and to write.
>
> —Yi Wŏnu, "How to Write Well"

The North Koreans watched their Soviet patrons send satellites and cosmonauts into orbit and change the flows of their rivers. Their grand-scale reform of nature offered an enticing metaphor for the sweeping political and social revolution that the North Koreans sought to undertake. But the engagement with science and technology had to be founded on a social restructuring in which the relationships between self and collective and between the individual and nature were defined in moral terms. The medium of language, and narrative more specifically, offered educators, scientists, and other stakeholders in the retraining of young Korean

minds the ideal form with which to carry out this moral restructuring. Narrative, in its suasive use of language, voice, and characters, could add to value-neutral data and formulas—the very same information being used by Americans—moral weight in a way that would tip the scale in favor of the socialist projects.

The fight for scientific and technical dominance could not simply be won by production numbers or even by social cohesion resulting from moral restructuring. The final frontier was the mind of the young, the space of fantasy. This was the place of dreams, that psychic space of individual minds looking into the future, that was the most important and most difficult to reach. Just as the American vision of the good society hinged on the definition of "creativity" and "the open mind" and marked America's enemies as irrational, closed-minded authoritarians,[83] North Korean writing about fantasy was an attempt to map the acceptable and unacceptable limits of the private sphere of the mind and provide the moral guidance that would structure young imagination.[84]

The editors of the magazine *Sae sedae* published a six-part essay on the term *fantasy* or *kongsang* in 1958. In its first installation, "About Fantasy," Yi Namsan defines the scope and potential of fantasy, a term that had entered the hearts of young people who are the future of North Korea and who harbor passionate fantasies and lofty ideals about the future. Fantasy, Ri explains, is a unique state of imagination (*sangsang*) that drives creativity, invention, scientific discoveries, and also concrete actions. Imagination can be further divided into imaginative recreation (*chaegusŏng sangsang*) and creative imagination (*ch'angjojŏk sangsang*). Of these two, creative imagination is the more complex. It is spontaneous (*ch'angbal*), and it emerges from a "creative engagement" that has "noble results," as experienced by writers, artists, scholars, and inventors. Most importantly, what drives and regulates creative imagination are the ideological tendencies of an individual.[85] It is ideology and one's worldview that makes imagination into reality and that constitutes creative imagination. Fantasy shares certain qualities with creative imagination, but it differs in two ways: first, it is always future-oriented, as an expression of wishes, and it gives form to shared feeling. As such, it does not lead to objective results like artistic works, scientific discoveries, and inventions. Fantasy is the first stage of creative imagination. Ultimately, what makes fantasy valuable depends on its relationship with human activity. The value of fantasy is directly related to the degree to which it is connected to real lives. In contrast, that which draws people away from reality is harmful and results in negative fantasy, which is driven by personal ambition, an inflated sense of self-worth, or a desire for personal enjoyment. In Yi Namsan's view, fantasy is a future-orientated, quasi-affective state that comes before the more desirable and more complex state of creative imagination. It is vulnerable because it can so easily fall prey to temptations of individualism, which leads to exploitation and anticollective behavior. Notable here is the privileged place that youth occupy in the minds of those writing about fantasy. In the following month's installment, famed writer Yi Kiyŏng notes that what makes students special is their innocence and "simple" thinking. This state makes the raw site of fantasy so easily exploitable. As a solution, he exhorts

them to "plant their feet firmly in the ground" and avoid excessive fantasy or delusion,[86] which can easily lead youth astray. By contrast, for Kim Man'gŭm, chairman of the party in South P'yŏngan Province, what makes fantasy productive is effort, and even more so, morals: "Beautiful, realistic fantasy cannot exist without socialist morals. Before fantasizing about the future, you have to acquire moral values [*todŏkchŏk p'umsŏng*]."[87] For the president of Kim Il Sung University, the fantasy driving American actions makes them issue "space passports" and has them thinking of ways to sell lunar real estate. By contrast, Soviet fantasy is driven by their ability to successfully conquer the universe and bring peace to earth and deliver happiness. Theirs is a realistic fantasy, based on real advances and success in science.[88] For Ch'oe Myŏnghak of the Science Academy, true fantasy (*chinsirhan kongsang*) is that which is based in reality and that which works for the benefit of the nation and the people and follows the path directed by the party.[89]

The essays about fantasy in the January and February issues of *Sae sedae* were followed by a deluge of reader responses. According to the editors, the magazine received five hundred, of which only ten were published; the editors even noted an increase in the number of visits to their company by passionate readers wanting to discuss the issues in person.[90] The student essays published by the magazine echoed for the most part the directives laid out by the essays mentioned above: that fantasy was something that comes out of reality, benefits the collective, and comes out of trained ideology and study.[91] Every attempt at making fantasy concrete—as emerging from real life, following specific party directives, and responding to studied materials—was also couched in the language of the moral: the only kind of fantasy that was worth pursuing was "true." Any other kind of fantasy was condemned as pandering to human depravity.

In postliberation North Korea, the urgency to build a socially cohesive and technically advanced country was predicated on the moral restructuring of youth. Scientific content in science and literary magazines proved to be an effective site for this goal. In particular, the power of narrative and its mobilization of language showed itself to be an effective conduit of moral behavior. But the anxiety of the slippage of language and the pre- or extra-linguistic site of imagination showed itself to be a persistent source of concern. A focus on the narrative devices that worked to reshape moral thought and to conquer the frontier of fantasy demonstrates the ways in which the war for science and technology was waged with the power of story.

NOTES

1. Yoneyama, *Hiroshima Traces*, 152. See chapter 5, "Ethnic and Colonial Memories: The Korean Atom Bomb Memorial."

2. Yi Chuhwan, "1945–1949-yŏn Pukhan esŏ ŭi munmaeng t'oech'i undong yŏn'gu," 367; S. Kim, *Everyday Life in the North Korean Revolution*, 98.

3. The new system, established in December 1946, was known as the *pot'ong kyoyuk ch'egye*, and it followed the Soviet model of education. This included five years of elementary education, three years of early middle school, and three years of high middle school. In addition, the *kisul kyoyuk ch'egye* system provided vocational and professional training to the foundational curriculum. See Yi H., "Pukhan sahoejuŭi kyoyuk ŭi hyŏngsŏng," 25–26. See also Sin, *Pukhan ŭi munhwa hyŏngsŏng kwa taejung kyoyuk*. Charles Armstrong notes that education, made available to the working class, peasants, and women, was to be the most effective tool of political cohesion and social mobility. See Armstrong, *North Korean Revolution*, 168. On the influence of Soviet models for North Korea's budding field of science and technology, see Kim Kŭnbae, "Pukhan kwahak kisul ŭi yŏksajŏk chŏn'gae"; and Kang, *Pukhan kwahak kisul hyŏngsŏngsa*, 1, 31.

4. Kim Il Sung University was established in September 1946, followed by the engineering, medical, and agricultural schools in 1948. Kim Kŭnbae, "Pukhan kwahak kisul ŭi yŏksajŏk chŏn'gae," 380.

5. Ibid., 385.

6. Kang, "Hyŏnji yŏn'gu saŏp kwa Pukhansik kwahak kisul ŭi hyŏngsŏng," 202–3.

7. *Haebang hu 10-yŏn'gan ŭi konghwaguk inmin kyoyuk ŭi palchŏn*, 13–14.

8. Moore, *Constructing East Asia*.

9. Shapiro, *Mao's War against Nature*.

10. Pollock, *Stalin and the Soviet Science Wars*, 2.

11. Krige, *American Hegemony and the Postwar Reconstruction of Science in Europe*, 3.

12. See Eagleton, *Ideology*.

13. Ibid., 2.

14. C. H. Kim, "Total, Thus Broken," 70.

15. Armstrong, *North Korean Revolution*, 168.

16. To quote Kim Il Sung: "The students and young people of North Korea should polish [*yŏnma*] their advanced science and technology skills and arm themselves with the patriotic ideology that is truly in service of the People in order to become the well-prepared, skilled workforce and the protagonists of the future." "Mŏrinmal."

17. Kim Kyusŏp, "Uri nara ŭi kwahak palchŏn ŭl wihayŏ," 6.

18. Ibid., 6–7.

19. Ibid., 7–8.

20. *Kwahak segye* was published by the Kungnip Inmin Ch'ulp'ansa beginning in June 1949. The last available issue was published in July 1950. Each issue ran approximately one hundred pages in length and included introductory essays, biographies of notable scientists, and general-knowledge essays on physical and natural sciences. The target audience of the magazine is not clearly stated, but its bright and eye-catching covers, entertaining illustrations, and occasional address of "youth" seem to indicate that it was geared toward a broad audience of primarily non-adult readers/students.

21. Kwon and Chung, *North Korea*, 4.

22. Hecht, *Being Nuclear*, 6–8.

23. I categorize the target audience of my sources as "young reader" and "student" based on the way in which the editorials addressed readers and on the ages of the readers whose letters were published in the magazine. Generally speaking, the audience for the magazines discussed in this article ranged from elementary school (*inmin hakkyo*) to middle and high

school (*ch'ogŭp chunghakkyo* and *kogŭp chunghakkyo*). For the postliberation formation of the North Korean school system, see Yi H., "Pukhan sahoejuŭi kyoyuk ŭi hyŏngsŏng."

24. Paek, "*Kwahak segye* ŭi saehae ŭi kidae," 7.
25. "Hŭin yŏn'gi wa kŏmŭn yŏn'gi."
26. "Sahoe esŏ irhasinŭn ŏmŏni wa nunadŭl."
27. "Kwahak ŭi kippal ŭl nop'i tŭlgo ap'ŭro," 5. For another appearance of the term *true scientists*, see also Yi S., "1950-yŏn ŭl majŭmyŏnsŏ."
28. "Kwahak ŭi kippal ŭl nop'i tŭlgo ap'ŭro," 4.
29. Han K., "Ch'ŏngnyŏn hakchadŭl ŭn kwahak chisik yŏn'gu e tŏuk noryŏk haja," 6.
30. Ibid.
31. Yi Y., "Ŏrin kwahakchadŭl," 35.
32. Kim Chŏl, "Hwanggŭmsan ŭi saesosik," 32, 33.
33. "Kim Ilsŏng susang ŭi sinnyŏnsa rŭl nop'i pattŭlgo," 2–3.
34. Yi Chaegyŏng, "Sahoejuŭi sidae," 52–53.
35. Kim Kimin, "'Na ŭi kŏt' kwa 'uri ŭi kŏt' e taehan iyagi."
36. Ibid., 10.
37. "Mangwŏn'gyŏng pudae," n.p.
38. Yi Chaegyŏng, "Sahoejuŭi sidae," 52–56.
39. "Sahoejuŭi todŏk p'umsŏng."
40. Yun, "Chiptanjuŭi todŏk ŭi wŏnch'ik."
41. *Sae sedae*, November 1958, 30–36.
42. *Sae sedae*, December 1958, 46–51.
43. *Sae sedae*, December 1958, 48.
44. Han T., "Haksaeng ch'ŏngnyŏndŭl."
45. Tong, "Ssoryŏn esŏ widaehan chayŏn kaejo."
46. "Naeil ŭi kwahak haenggun ŭn ŏdero?," 26.
47. Han C., "Isibil-segi saram kwa ŭi tamhwa."
48. "Ssoryŏn ŭi taejayŏn kaejo," 62.
49. Ch'oe S., "Wŏnjaryŏk illyu ŭi haengbok ŭl wihayŏ," 21.
50. "Haengbok iran muŏt in'ga." "Even if it means sacrificing the self, this is done for the victory of the collective, which is also [victory] for the individual, and is therefore is in and of itself eternal happiness and honor" (20). This quality of happiness is contrasted with the kind of exploitative behavior engaged in by capitalist societies, which operate out of greed and the design to create benefits for a select elite few (ibid.).
51. Puckett, *Narrative Theory*, 2.
52. Ibid., 18.
53. Needham and Robinson, "Literary Chinese as a Scientific Language," 5–6.
54. Beer, "Translation or Transformation?," 87.
55. Shaffer, "Editor's Introduction," xxiii.
56. Beer, "Translation or Transformation?," 81.
57. Ibid., 88.
58. Ibid., 90. David M. Locke writes, "It is the process of selecting, shaping, organizing, and arranging of the material [that produces] an effect—even an effect of clarity and directness of presentation, if not of 'power' and infallibility—that certain scientists have come to recognize as signaling the nature of the scientific document." Locke, *Science as Writing*, 8.
59. Locke, *Science as Writing*, 13.
60. Ibid., 24.

61. Ibid., 26.
62. Ibid., 35.
63. Rimmon-Kenan, *Narrative Fiction*, 16.
64. Puckett, *Narrative Theory*, 6.
65. "Pyŏ," 2–3.
66. Kim Chŏl, "Ch'ŏri wa Ogi," 23.
67. An, "Myŏnghuni ka mandŭn rok'et'ŭ."
68. For other examples in this series, see An, "Hwasan i t'ŏjinda."
69. See Rimmon-Kenan, *Narrative Fiction*, esp. chapter 7, "Narration: Levels and Voices," 86–105.
70. "Pyŏ."
71. Pak, "Sŏkt'an ŭi yosul."
72. Cheehyung Kim, "North Korea's Vinalon City," details how the production of vinalon came to symbolize the synthesis of ideology and industrial work.
73. Kim Munyŏl, "Chisik ŭi saemt'ŏ." The name attributed to this letter is Kim Munyŏl, which is typically a boy's name, but the picture is that of a female student, so I have gendered this quote as female.
74. Kim Pyŏngsŏp, "Tokcha ro put'ŏ on p'yŏnji," 89.
75. Rimmon-Kenan, *Narrative Fiction*, 107.
76. Ibid., 109.
77. "Uju e ro ŭi ryŏhaeng."
78. An, "Hwahak ŭi palchŏn," 3.
79. Kim Y., "Uju kisangdae," 38.
80. Sim, "Nara taninŭn pae."
81. Ibid., August 1965, 37.
82. Yi W., "Kŭl ŭl ŏttŏk'e hamyŏn chal chiŭl su issŭlka," 22. For more on Yi in the context of North Korean children's literature, see Wŏn, *Pukhan ŭi adong munhak*.
83. See Cohen-Cole, *Open Mind*.
84. Andre Schmid observes, too, that ideology lagged behind material conditions and that "it was within the shining of an individual . . . that one could identify the source of socioeconomic and other ills." Schmid, "'My Turn to Speak,'" 125.
85. Yi N., "Kongsang e taehan iyagi," 34. Yi was a professor of education and the dean of the Sariwŏn Education College.
86. Yi K., "Isang kwa hyŏnsil," 24.
87. Kim Man'gŭm, "Kongsang ŭn t'ujaeng ŭro sirhyŏn haeya handa," 25.
88. Yu, "Kongsang kwa insaenggwan."
89. Ch'oe M., "Hullyunghan kongsang iran?"
90. "Chinsilhan kongsang."
91. Ibid.

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