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GEORGE LEWIS'S *VOYAGER*

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Founded on Chicago's South Side in 1965 by four African American composers, the Association for the Advancement of Creative Musicians (AACM) was the most significant collective organization in the history of jazz and experimental music. Or rather, *is* the most significant—the Association celebrated its fiftieth anniversary in 2015 and shows no signs of slowing down. Important new AACM artists seem to emerge every few years, and the Association's impact can be seen in many corners of contemporary culture, including visual art, intermedia performance, and aesthetic theory. But its influence may be strongest in the realms of social relations and musical sound.

From the earliest years of the organization, AACM musicians were united by a social commitment to support one another's creative pursuits. This ethic of mutual support was evident in countless concerts and recording sessions, when AACM composers called on fellow members of the organization to help bring their music to life. The AACM's social relationships also operated behind the scenes, making the Association a dynamic community of "dedicated creative artists" who constantly encouraged their colleagues to keep practicing, studying, and developing their music.[1] In this social environment—or "atmosphere," the term favored in the 1960s—AACM musicians were expected, even required, to be innovative (Lewis 2008, 116–118). The members responded to this mandate by creating a number of performance practices and musical techniques that would become synonymous with the Association, from multi-instrumentalism and the use of "little instruments" to extended forms and unprecedented blends of composition and improvisation.[2]

The AACM's 1960s innovations attracted immediate attention from Chicago audiences and critics, and a series of recordings with local independent labels like Delmark brought the music from the South Side to listeners around the world. Indeed, albums such as Roscoe Mitchell's *Sound* (1966), Joseph Jarman's *Song For* (1967), Muhal Richard Abrams's *Levels and Degrees of Light* (1968), and Anthony Braxton's *For Alto* (1969) were so revolutionary that the AACM's place in history would be secure even if the organization had disbanded at the end of the 1960s, like most other musicians' collectives formed during that decade. Instead, the Association continued to thrive. In 1969, Mitchell and Jarman's Art Ensemble of Chicago relocated to Europe, as did Braxton and his bandmates Leroy Jenkins and Wadada Leo Smith. By the early 1970s, Braxton's group and the Art Ensemble were back in the United States, recording for New York-based major labels and encouraging many of their AACM colleagues to move to the East Coast. In Chicago, meanwhile, the Association was welcoming a steady stream of new members, throughout the 1970s and in every decade thereafter.

Of all the figures who joined the AACM during its 1970s "second wave," few did as much to shape the organization as George Lewis. He came aboard in 1971, and four years later served briefly as the Association's chair, directing the 1975 Tenth Anniversary Festival, a landmark event that established a precedent for AACM anniversary concerts presented at high-profile venues in Chicago (Lewis 2008, 313, 318–320). Lewis also functioned as the AACM's in-house historian. From the 1970s to the twenty-first century, he published a number of important writings about the Association, including the book *A Power Stronger Than Itself* (2008), the definitive history of the AACM. Additionally, Lewis's performances and compositions left a lasting mark on the Association. In the mid-1970s, he established himself as one of the world's top trombonists, recognized for his virtuosic technique and his imaginative approach to improvisation. By the end of the decade, he was making music with computers and synthesizers, often blending electronic sounds with traditional acoustic instruments. These early experiments were successful, and during the 1980s and 1990s, computer music became central to Lewis's compositional practice. He also composed for acoustic ensembles, writing chamber music, orchestral scores, pieces for improvising groups of all sizes, and even an opera, *Afterword* (2015), based on the final chapter of *A Power Stronger Than Itself.*

Lewis's best-known composition was *Voyager,* a pioneering work in which a human musician and a software-powered "virtual orchestra" improvise together (Lewis, quoted in Parker 2005, 84). A number of leading improvisers have given performances of *Voyager*—Miya Masaoka, Roscoe Mitchell, Evan Parker, and many more—but usually the featured instrumentalist was Lewis himself on trombone.[3] In the decades since its 1987 premiere, *Voyager* has been played in hundreds of concerts around the world, making it Lewis's most-performed piece, and perhaps the most-performed work by any AACM composer (Lewis 2014). Another measure of *Voyager*'s significance: the prominent place it occupies in histories of experimental music, which portray the piece as a major breakthrough in "human-computer interaction" (Born 2005, 32). These histories tend to emphasize the composition's technical features, its relationships to comparable works, and other topics of interest to computer music researchers. With few exceptions, however, these histories neglect to examine a crucial influence on *Voyager*: the musical practices of the AACM.[4] This chapter sheds new light on *Voyager,* placing the composer's own statements about the origins and meaning of the work in dialog with an analysis of a 1995 performance at an AACM concert in New York.[5]

Prelude

Lewis attended his first AACM event when he was still in high school. Born in Chicago during the summer of 1952 and raised on the city's South Side, he attended public schools for a few years before receiving a scholarship from the Laboratory School, a prestigious K–12 academy operated by the University of Chicago. Lewis took up the trombone at the Lab School, playing in the concert band, jazz band, and orchestra. By his mid-teens, he was listening to bebop, avant-garde tape compositions, and late-period John Coltrane—an array of contemporary music styles that should have prepared him for his first AACM concert, a 1968 performance by tenor saxophonist Fred Anderson (Lewis 2008, 281–282). Anderson sounded a bit like Coltrane in those days, and his group played compositions modeled on the music of another free jazz innovator, Ornette Coleman (Steinbeck 2010, 4).[6] However, Lewis had a hard time comprehending Anderson's fierce performance. "It was . . . too far out for me, and I just couldn't figure it out," he remembered (Lewis 1997a). Still, Lewis was intrigued, and he attended several more AACM concerts during his senior year at the Lab School. One of these AACM experiences was especially unforgettable: the Art Ensemble of Chicago, in one of the last performances given by the group members before their 1969 move to Europe. The Art Ensemble event took place on

the University of Chicago campus, just down the street from the Lab School, and Lewis had a front-row seat. As he recalled:

> I was stunned by Joseph Jarman's body-painted arms, attacking a vibraphone with mallets swishing dangerously close to my nose. I remember being so frightened that I literally seemed to faint. When I came to, Lester Bowie's trumpet squeals and raspberries were leading to long drone sections where Malachi Favors' bass unwound long strings of melody, while Roscoe Mitchell contentedly puttered about in a secret garden of percussion.
> *(Lewis 2008, 282)*

Not long after the Art Ensemble concert, Lewis finished high school. As a Lab School graduate, he had the credentials to be admitted to an elite university, and he chose Yale, becoming one of ninety-six black students in the 1969 freshman class—then the largest cohort of black undergraduates in the institution's history (Karabel 2005, 66). At Yale University, Lewis hoped to major in music. Unfortunately, Yale's music professors were less than welcoming to students without classical training, and Lewis became disenchanted with the university. So he took a break from Yale after his sophomore year and spent 1971–1972 back in Chicago, working a nine-to-five job and practicing his instrument. One day in the summer of 1971, he was walking home from work when he heard a band rehearsing—it was Muhal Richard Abrams's group. Lewis introduced himself to Abrams's crew and revealed that he played trombone. Within weeks, he was invited to perform with some of the AACM's foremost musicians, including Abrams, Douglas Ewart, Steve McCall, and the members of the Art Ensemble. Soon Lewis was formally accepted into the Association, and 1971–1972 became his "AACM year," a period of intensive study that gave him a thorough grounding in the AACM's practices and inspired him to pursue a career in music (Lewis 1997a).

In the fall of 1972, Lewis returned to Yale. He changed his major to philosophy, bypassing the university's conservative music faculty, and earned his BA in 1974. Then he headed home to Chicago, where he reunited with the AACM and worked as a freelance trombonist. He also began to delve into composition, studying with Abrams as well as with Richard McCreary, an African American composer of electronic music who taught at Governors State University in south suburban Chicago (Lewis 1997a). Before long, Lewis's performance career was on the rise, and he was coming into his own as a composer. By 1976, he was touring internationally with artists like Count Basie and fellow AACM member Anthony Braxton (Lewis 2008, 341). He was also developing important electroacoustic compositions like *Homage to Charles Parker,* for electronics, percussion, synthesizers, and trombone (Parker 2005, 83). In 1977, while visiting California, he met David Behrman, a computer music pioneer who devised software that enabled personal computers—also known as "microcomputers," then a brand-new technology—to interact sonically with other computers and even with human instrumentalists (Lewis 2007, 86–87). After the encounter with Behrman, the possibilities of computer music seemed endless to Lewis, and he "rushed home . . . determined to get a microcomputer." He "postpone[d] paying the rent that month to buy the thing," and started teaching himself how to program while in the process of moving from Chicago to New York (Lewis 2007, 88). Lewis was a quick study: in 1979, at the Kitchen performance space in downtown New York, he premiered his first computer music piece, *The KIM and I,* in which his trombone interacted with a custom-built computer controlling a Moog synthesizer (Lewis 2007, 83).

Interactive computer pieces like *The KIM and I* opened numerous doors for Lewis. He already had a name on the jazz scene, especially along the European and North American corridors where AACM musicians toured and recorded, but now his compositions were gaining an audience in the world of experimental music. Eventually this led to recognition from prestigious foundations and research institutions, including a "genius grant" from the MacArthur Foundation (2002), an

endowed professorship at Columbia University (2004), and fellowships from the Guggenheim Foundation (2015), the American Academy of Arts and Sciences (2015), and the British Academy (2016). The first fruits of Lewis's computer music efforts, however, were invitations to return to the Kitchen, initially as a composer-performer, and later as the center's music director from 1980 to 1982 (Lewis 1997a, 2008, 384). The connections he made at the Kitchen helped him secure his next position, a residency at the Institut de Recherche et Coordination Acoustique/Musique (IRCAM) in Paris. While at IRCAM, Lewis composed and premiered a new computer music piece, *Rainbow Family* (1984), which would form the foundation for *Voyager*. *Rainbow Family*, like its famous successor, was conceived as an interactive work for human instrumentalist(s) and an improvising orchestra. In this composition, the orchestral textures came from a trio of Yamaha DX-7 synthesizers controlled by Apple II computers running Lewis's own software. At the heart of the software was a group of algorithms that created music in real time while also generating sonic responses to the playing of four improvising soloists: Derek Bailey, Douglas Ewart, Steve Lacy, and Joëlle Léandre (Lewis 2007, 90–91). Performed to a "packed" house at IRCAM, the *Rainbow Family* premiere was a technical and creative triumph (Lewis 1997a). IRCAM's old-guard directors—then engaged in a power struggle with Lewis and his sponsors—reacted less favorably, but even they could not dim Lewis's enthusiasm for his project (Born 1995, 192). He started searching for a friendlier work environment, and found one at the Studio voor Electro-Instrumentale Muziek (STEIM) in Amsterdam. Lewis left Paris at the end of 1985 to take a resident-artist position at STEIM, and immediately after his arrival, he began developing his next series of interactive compositions, culminating in *Voyager* (Lewis 1997a, 2000b, 34).

Listening to *Voyager*

The 1987 *Voyager* premiere was the first of many versions of the composition. Over the following two decades, Lewis continued to revise the work in response to new performance opportunities and advances in technology. Initially, *Voyager*'s musical output was sent from a Macintosh computer to a Yamaha synthesizer (as in *Rainbow Family*), but during the 1990s, Lewis updated the software so that it could generate sounds directly using Musical Instrument Digital Interface (MIDI) samples. And in the 2000s, Lewis recreated the entire composition in a new programming language—Max/MSP rather than Forth—allowing the software to play an acoustic piano, the MIDI-capable Yamaha Disklavier (Lewis 2014). All of these versions, though, relied on the same underlying architecture and reflected Lewis's original vision for *Voyager*: a software-driven, improvising entity that could create orchestral textures based on the sonic ideals of the AACM (Lewis 2007, 83).

The AACM's musical practices influenced *Voyager* in a number of areas, especially the work's distinctive instrumentation. *Voyager* was an orchestral composition, but the (virtual) instruments heard in performances were not limited to those found in a European symphony orchestra. Instead, *Voyager* combined symphonic strings, winds, and percussion with instruments from Africa, the Americas, East and Southeast Asia, and the Middle East. These sonic resources could—theoretically—yield textures as dense as a *tutti* orchestra, but ordinarily the software chose much sparser groupings of instruments, often forming unconventional "ensembles" rarely encountered in the concert hall (Lewis 2000b, 34–35). These configurations sounded less like a handful of players plucked from a symphony and more like a gathering of AACM multi-instrumentalists—groups such as Muhal Richard Abrams's Experimental Band and the Art Ensemble of Chicago, in which the musicians had an array of instruments at their fingertips. The AACM's explorations of multi-instrumentalism began in the 1960s, when Experimental Band members, the Art Ensemble, and other AACM improvisers "moved to develop multiple voices on a wide variety of instruments" (Lewis 2000b, 36). By the decade's end, the members of the Art Ensemble were

playing dozens of different instruments each, as Lewis discovered during that late 1960s concert at the University of Chicago, where Joseph Jarman and Roscoe Mitchell performed on percussion as well as various woodwinds (Lewis 2008, 282; Steinbeck 2017, 49–50). The next time Lewis encountered the Art Ensemble, at the 1972 show documented on the Delmark album *Live at Mandel Hall*, the band's instrument collection had grown exponentially (Art Ensemble of Chicago, 1974; Steinbeck 2017, 181–212). "When I saw the Art Ensemble in 1972," he remembered, "they'd have like a thousand instruments on stage" (Lewis, quoted in Parker 2005, 84). In performances such as this, Lewis observed, "the extreme multiplicity of voices, embedded within an already highly collective ensemble orientation, permitted the timbral diversity of a given situation to exceed the sum of its instrumental parts, affording a wider palette of potential orchestrations to explore" (Lewis 2000b, 36).

Voyager's relationship to AACM-style multi-instrumentalism was evident in every performance, and at times its sound could uncannily resemble certain AACM groups. For example, listen about seven minutes into Lewis's September 16, 1995 performance of *Voyager*, at a concert hosted by the New York chapter of the AACM (Lewis 2000a). As the piece approaches the seven-minute mark, the texture created by *Voyager* grows more and more complex. Sounds reminiscent of an old analog ring modulator are joined by other synthesizers, percussion instruments, and even a harmonica. The orchestra begins to grow louder, then suddenly falls silent, and a few seconds afterward, Lewis drops out too. At 7:10, when *Voyager* returns, it is playing five new instruments: drum set, a log drum, marimba, double bass, and a low-pitched saxophone. This particular combination of instruments can be heard in numerous performances by the Art Ensemble of Chicago, with Famoudou Don Moye on drum set, Lester Bowie on log drum (or concert bass drum), Joseph Jarman on marimba, Malachi Favors Maghostut on bass, and Roscoe Mitchell on baritone or bass saxophone. In this Art Ensemble-esque passage, *Voyager*'s playing is spacious and searching, and when Lewis rejoins the texture, he adopts a similar improvisational approach, sounding just one note at a time on his trombone and waiting for the orchestra to respond. The texture continues until 7:46, when several winds, strings, and synthesizers enter in short succession, drowning out all of the old instruments except the drum set and marimba. It is as if an Art Ensemble concert has been interrupted by another group, perhaps Misha Mengelberg's ICP Orchestra or one of Muhal Richard Abrams's big bands from the 1980s and 1990s (Abrams 1983, 1989, 1991). Lewis, too, hears this intervention as a break from the previous Art Ensemble texture, and he decides to rest, allowing *Voyager* to take the lead.

Lewis remains silent for quite some time: thirty seconds elapse before he plays his next note. This period of rest, though, is brief in comparison to the way Lewis elected to open the performance, when he let *Voyager* play unaccompanied for almost three minutes before entering. During these orchestra-only passages, *Voyager* demonstrated to the concert audience that it was able to create its own music in real time, with or without Lewis's trombone. Indeed, in any *Voyager* performance, all that the human instrumentalist needed to do was type the commands "start playing" (to begin the piece) and "stop playing" (to bring the concert to a close). In between "start playing" and "stop playing," the musician did not have to make a single sound or provide the software with any additional input (Lewis, quoted in Dean 2003, 164). The *Voyager* orchestra, in other words, could conduct itself. For Lewis, this meant that *Voyager* was "incarnatic," not "prosthetic"—it made independent musical decisions and was not a mere extension of the human performer (Dean 2003, 81). According to Lewis:

> If you choose to go in and play [with *Voyager*], it's happy to listen to you and dialog with you, or sometimes ignore you, but the conceptual aspect of it is that it's pretty autonomous. You can't tell it what to do. . . . So improvisation becomes a negotiation where you have to work with [*Voyager*] rather than just be in control.
>
> *(Lewis, quoted in Parker 2005, 85)*

Voyager used a software subroutine called *setphrasebehavior* to generate its music. This subroutine determined which of the orchestra's instruments would play and arranged these instruments into one or more "ensembles," each with its own distinctive musical behavior (Lewis 2000b, 34). Ensembles were assigned different pitch sets and tuning systems, algorithms for spontaneously composing melodies, and many other parameters that shaped their sonic output, including event-density, melodic range, tactus, tempo, and volume. The *setphrasebehavior* routine ran every few seconds, forming new ensembles and transforming the old ensembles by recombining or even silencing their instruments. At the same time, *setphrasebehavior* decided how each ensemble would interact with the human improviser, either "imitating, directly opposing, or ignoring" the sounds he or she played (Lewis 2000b, 35).

If the human performer was resting, *Voyager* could keep making music by itself. But while the instrumentalist was playing, *Voyager* listened closely, converting his or her sounds into MIDI data and tracking some thirty musical parameters (Lewis 1993b). In the rhythmic realm alone, *Voyager* measured sounding duration, interonset duration, interonset duration range, and frequency of silence (Lewis 1999, 103–104). MIDI listening gave *Voyager* a detailed and continuously updated map of the human musician's input. However, the program did not use this data to detect melodic motives or store up musical ideas for later use. In Lewis's view, those techniques were "essentially Eurocentric" and would conflict with *Voyager*'s non-hierarchical, AACM-inspired approach to open improvisation, in which the performer and the software worked together in real time to articulate musical form (Lewis, quoted in Dean 2003, 171).

Instead of merely echoing the notes played by the human musician, *Voyager* engaged in non-motivic, "state-based" approaches to listening, analysis, and interaction (Lewis 1999, 105). *Voyager*'s state-based analyses processed the performer's sounds not as isolated melodies and rhythms but rather as complex contributions to an ever-evolving texture. The software's *setresponse* subroutine, working independently of *setphrasebehavior*, aggregated and then averaged all of the musical parameters emerging from the instrumentalist's audio-to-MIDI input, de-emphasizing "moments of linear development" to more accurately represent the "sonic environment [in] which musical actions occur" (Lewis 1999, 105). This unconventional analytical technique enabled *Voyager* to respond to the human performer with astonishing sensitivity. During passages when *Voyager* was following the instrumentalist, it could emulate his or her input across virtually every parameter, and it often seemed to be reading the musician's mind. To describe this phenomenon of "bidirectional transfer of intentionality through sound," Lewis coined the term "emotional transduction," an allusion to electroacoustic devices like microphones and speakers that transduce—that is, convert—sound waves into electrical impulses, and vice versa (Lewis 2000b, 36). According to Lewis,

> musical behavior is a carrier for complex symbolic signals. [In *Voyager*,] [g]esture is construed as an intentional act, that is, an act embodying meaning and announcing emotional and mental intention. Through gesture the emotional state of the improviser may be mirrored in the behavior of the computer partner—a kind of 'emotional transduction' which is essential to a feeling of dialogue.
>
> *(Lewis 1997b, 5)*

There were many instances of emotional transduction in the 1995 *Voyager* performance, none more striking than an exchange early in the concert, shortly after Lewis's initial entrance. Prior to Lewis's entry, *Voyager* had been performing independently and creating a series of contrasting textures. The first distinct orchestral episode lasts a minute and a half. During this passage, *Voyager* introduces ten different instruments, none of which move to take charge of the texture—not even the piccolo and harp, which overlap in register and share the same melody-generating algorithm. After a brass-and-drums burst at 1:30, the orchestra resets itself: new ensembles are formed and

the texture gradually becomes denser. By 2:45, several instruments—balafon, koto, drums, and saxophone—are playing much faster and louder than before. Lewis seems to want *Voyager* to do something else, and at 2:57 he finally picks up his trombone and proposes an alternative musical idea, playing a single note, E♭3, at a moderate volume. One of the orchestra's ensembles immediately follows suit. A few woodwinds play a quiet melody, G4–E♭4–D4, and the strings repeat this line an octave higher, joining with the wind instruments to form a delicate harmony. However, this contrapuntal texture is short-lived. The balafon, which had been playing unobtrusively underneath the winds and strings, begins to perform frantic glissandos in the upper register, rejecting Lewis's attempted intervention and pushing all the other orchestral instruments to the background. As the new texture unfolds, the balafon sounds like it could continue in this vein indefinitely, and at 3:24, Lewis intervenes again with a markedly oppositional gesture. He plays an inversion of the winds' G–E♭–D melody, drawing out each note and using a loud, brassy tone that covers up the balafon. *Voyager*'s other ensembles react instantly. Synthesizers and strings enter first, followed by brass instruments and saxophones that precisely match Lewis's durations, volume level, and tone color. This musical consensus emerges so quickly that even the balafon seems compelled to respond. It drops out briefly, then resurfaces at 3:30, performing sparsely and softly, with no hint of the busy glissandos it was playing just seconds before. The texture has been transformed, not only through Lewis's incisive musical gestures but also because of how *Voyager* interpreted his intentions. This is exactly how *Voyager*'s emotional transduction was meant to work. "When everything is going properly," Lewis affirmed,

> what people play into the computer should come out of the computer with some aspect of the emotional and other messages that are part of the sound intact. What people are playing are carriers for another signal; the sounds we hear aren't the main thing. . . . You have to approach it on the level of *emotion*, on the level of creating dialogue.
>
> *(Lewis, quoted in Casserley, 2006)*

In *Voyager* performances, the process of emotional transduction was not always led by the human musician. Emotional currents could also flow from *Voyager* to the performer, when the orchestra suggested a particularly evocative musical state and the instrumentalist played gestures to confirm the new texture. One such interaction takes place around the nine-minute mark of the 1995 performance. Lewis is fully warmed up at this point in the concert, and every facet of his formidable technique is on display as he plays virtuosic runs spanning the trombone's three-octave range. *Voyager*'s orchestral contributions are just as colorful, with a number of different instruments chattering away, from brass, saxophones, and strings to drums, synthesizers, and an African mbira. Then at 9:03, the orchestra's strings land on a low E♭2, creating a dramatic pedal point that demands a response. Lewis answers right away. A split second after the orchestra's arrival on E♭2, he plays the same note two octaves higher, holding E♭4 for a moment and then bending it upward through E4 and F4—a chromatic climb that pulls hard against the low pedal point in the strings. When Lewis pauses for an instant to breathe, *Voyager* keeps the texture going, using the saxophones to add a few more high register long tones. Once Lewis catches his breath, he returns with another E♭4–E4–F4 ascent, and this time *Voyager* assembles its pedal point texture from the top down. The orchestra's instruments enter one by one, playing a descending sequence of long tones that form a lush E♭ dominant-thirteenth chord, capped off by another low E♭ in the strings. Lewis chimes in with a low E♭ of his own, reinforcing the chord outlined by *Voyager*. At 9:12, the orchestra's chord begins to recede, and Lewis offers yet another supportive gesture, stepping down from E♭3 to D3 as the orchestra fades to silence. Lewis's adroit resolution of the E♭ harmony gives the orchestra space to establish a new texture, and *Voyager* does just that, directing a few instruments to dialog with Lewis while forming additional ensembles that gradually lead the improvisation in a different direction.

Postlude

The 1995 *Voyager* performance continued for another eleven minutes, with fascinating exchanges like this throughout. Lewis or *Voyager* would present a compelling sonic gesture, and the other would respond in ways that kept the improvisation moving forward into new textures and possibilities. For many in the concert audience, passages characterized by audible agreement and emotional transduction would have been the highlights of the performance, and they might have concluded that Lewis's ambition for *Voyager* was designing a "creative machine" capable of passing a musical Turing test by improvising as intelligently as a human instrumentalist (Lewis 2007, 83). However, the dozen or so AACM musicians in the house would likely have heard the performance differently, as a real time demonstration of the aesthetics—and ethics—of open improvisation (Lewis 1996, 111). The members of the Association had long been attuned to the social implications of musical sound, as Lewis learned when he joined the organization:

> I hadn't thought much about the process of creating music until I met people from the AACM in 1971 . . . play[ing] with people like Muhal Richard Abrams and Roscoe Mitchell. We talked about where music was coming from and what it was for—were we just making sounds and that's it? It seemed pretty clear that the tradition, at least in African American music, was really not centered around making sounds for their own sake. There is always an instrumentality connected with sounds; you make sounds for pedagogical purposes, to embody history or to tell stories, and so on.
>
> *(Lewis, quoted in Casserley, 2006)*

The AACM's social philosophies were at the core of *Voyager*, even though the piece involved a human improvising with a computer rather than an in-person encounter between multiple human performers. "When the computer possibilities came along I tried to maintain that [AACM] sensibility," Lewis stated,

> so I still think the interesting thing about computer music is focusing on the process of musical creation as done by humans. When you play *Voyager* the idea is that you put the computer on the stage in order to focus on the people.
>
> *(Lewis, quoted in Casserley, 2006)*

In the opening moments of a *Voyager* performance, listeners discovered that the software could create its own music without external input, just like a human improviser. As the performance continued, they heard *Voyager* engage with its human partner in every conceivable fashion, from sympathetic interaction ("emotional transduction") to ignoring or opposing the musician's sonic input. These were exactly the kinds of musical decisions made by the human instrumentalist—*Voyager*'s way of revealing to the audience the essential processes at the core of any group improvisation, whether human-computer, human-human, or even computer-computer.

When musicians improvise together, no matter the genre or style, they listen to one another, analyze the texture as it takes shape, and choose the kinds of sonic responses that will best serve the music. In an AACM-style open improvisation, moreover, the performers' rights and responsibilities are even greater. Improvisers who move away from standard forms take on a shared, mutual responsibility for determining how the performance will unfold. Furthermore, because all participants in an open improvisation can contribute musical ideas, no one possesses sole authority over the performance, and the ultimate trajectory of the piece must be determined by real time sonic negotiations in which everyone has the right to be heard. Entering into such an open-ended musical environment would be a considerable challenge for some improvisers, but not for George

Lewis and his AACM colleagues, who had been developing novel approaches to improvisation since the Association's founding. Indeed, in Lewis's book *A Power Stronger Than Itself*, the very history of the AACM becomes an open improvisation writ large. Establishing a new music community on Chicago's South Side, inventing the practice of multi-instrumentalism, carving out territory for African American composers and performers on the experimental music scene—all of these AACM accomplishments were without precedent and could only have been achieved by a group of artists working together to create order spontaneously, without relying on existing models. No two AACM members contributed to these efforts in the same way: Muhal Richard Abrams was the visionary leader, "first wave" AACM musicians like Anthony Braxton and the members of the Art Ensemble were the most committed to multi-instrumentalism, and Lewis was the Association's primary exponent of cutting edge computer music. But they all gave something of lasting significance, and in more than a few cases—including Lewis's *Voyager*—their musical offerings resounded for years on end.

Notes

1. In 1965, before the AACM had a name, the members considered calling the nascent organization the "Association of Dedicated Creative Artists" (Lewis 2008, 110–111).
2. For an account of the AACM's discovery of "little instruments," see Steinbeck (2017, 45–46).
3. Roscoe Mitchell appeared on the first recording of *Voyager* (Lewis 1993a).
4. A few studies (Born 2005, 27–28; Monaghan 2000, 146–147) briefly explore *Voyager*'s connections to the music of the AACM, but typically this important context is downplayed or ignored. See Dean (2003, 81–84, 123–126, 162–176, 178–179); Gbadebo (2012, 11–15); Gottschalk (2016, 209–210); Hagan (2016, 143–144); Nelson (2011, 112–113); and Tanner (1999, 47).
5. The 1995 performance of *Voyager* was released on Lewis's album *Endless Shout* (2000a).
6. Anderson's late 1960s playing can be heard on Joseph Jarman's *Song For* (1967) and *As If It Were the Seasons* (1968).

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