

SECTION IV
SCIENCE IN SOCIAL HISTORY
ESCAPING THE LABORATORY: THE RODENT
EXPERIMENTS OF JOHN B. CALHOUN & THEIR
CULTURAL INFLUENCE

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Introduction

In 1947, John B. Calhoun's neighbor agreed to let him build a rat enclosure on disused woodland behind his house in Towson, Maryland. Calhoun would later reflect that his neighbor probably expected a few hutches, perhaps a small run. What Calhoun built was quarter acre pen, what he called a "garden of eden," and, as the population expanded from a few individuals to many, a "rat city." Calhoun calculated that the habitat was sufficient to accommodate as many as 5000 rats. Instead, the population levelled off at 150, and throughout the two years Calhoun kept watch, never exceeded 200. That the predicated maximum was never reached ought to come as no surprise: 5000 rats would be tight indeed.¹ Be that as it may, a population of only 150 seemed surprisingly low. What had happened?

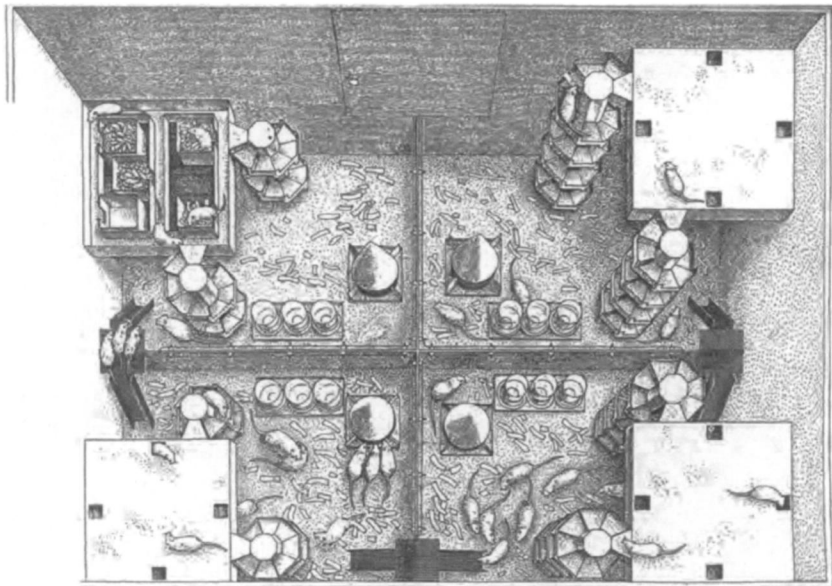
Employed in the Laboratory of Psychology of the National Institute of Mental Health from 1954, and later as Chief of the Unit for Research on Behavioral Systems in the Laboratory of Brain, Evolution and Behavior until 1986, Calhoun repeated the experiment in specially constructed "rodent universes." Using a variety of strains of rats and mice, he once more provided his populations with food, bedding, and shelter. With no predators and with exposure to disease kept at a minimum, Calhoun described his experimental universes as "rat utopia," "mouse paradise." With all their visible needs met, the animals bred rapidly. The only restriction Calhoun imposed on his population was of space—and as the population grew, this became increasingly problematic. As the pens heaved with animals, one of his assistants described rodent "utopia" as having become "hell."²

Males became aggressive, some moving in groups, attacking females and the young. Mating behaviors were disrupted. Some males became exclusively homosexual. Others became pansexual and hypersexual, attempting to mount any rat they encountered. Mothers neglected their infants, first failing to construct proper nests, and then carelessly abandoning and even attacking their pups. In certain sections of the pens, infant mortality rose as high as 96%, the dead cannibalized by adults. Subordinate animals withdrew psychologically, surviving in a physical sense but at an immense psychological cost. They were the majority in the late phases of growth, existing as a vacant, huddled mass in the centre of the pens. Unable to breed, the population plummeted and did not recover.

The crowded rodents had lost the ability to co-exist harmoniously, even after the population numbers once again fell to low levels. At a certain density, they had ceased to act like rats and mice, and the change was permanent.

Calhoun published the results of his early experiments with the rats at NIMH in a 1962 edition of *Scientific American*. That paper, "Population Density and Social Pathology," went on to be one of the most widely cited in psychology.³ It has since been included as one of "Forty Studies that Changed Psychology," joining papers by such figures as Freud, Pavlov, Milgram, Rorschach, Skinner, and Watson.⁴ Like Pavlov's dogs, Calhoun's rats came to assume a near-iconic status as emblematic animals, exemplary of the ways in which behavioral experimentation at once marks and violates the human-animal distinction. The macabre spectacle of crowded psychopathological rats and the available comparisons with *human* life in the densely-packed inner cities ensured that the experiments were quickly adopted as "scientific evidence" of social decay. Referenced far outside of the fields of ecology and mental health, Calhoun's rats have—or certainly had—come to seem part of the common cultural stock, shorthand for the problems of urban crowding just as Pavlov's dogs were for respondent conditioning. Along with their public popularity, the experiments played a critical role in the development of disciplines and research fields, so much so that sociologist and human ecologist Amos Hawley would remark that the extent of their influence was itself a "curious phenomenon."⁵

Figure 1



Aerial view of early rat enclosure, from Calhoun's article, "Population Density and Social Pathology," *Scientific American*, 1962.

Calhoun's approach—notably his blurring of the human-animal boundary—impacted upon the concerns of a generation; subsequent years would see his work used as an explanation for social problems in increasingly crowded urban environments: rioting, violent crime, sexual deviancy. What made the NIMH experiments uniquely influential, as we shall see, was not only Calhoun's decision to focus on behavioral rather than physical pathology (*vice* as opposed to *misery*—the more common of Malthusian concerns), but also his careful use of language. The transition from lab notes to *Scientific American* to the pages of newspapers, novels, film, and comic books, required relatively little translation. Constructing a typology of pathological crowding behaviors, he gives the groups names immediately resonant with human types. Most successful of all, the tendency to congregate in dense huddled knots of squalor and violence he called the “behavioral sink.” The mobility of Calhoun's findings was also aided by his preferred experimental organism: the rat, a creature synonymous with urban and indeed moral degeneration.

While Calhoun's experiments captured the imagination of scientists and the public alike, this paper will then turn to the tension between the popular and the scientific: how the popularity of his experiments came to impact upon his later research and reputation as a scientist. The *public* image of what Calhoun had achieved was largely negative: concerned with the macabre spectacle of the behavioral sink, with the horror story of the crowd. We shall see that this success in reaching broad audiences had serious repercussions for its interpretation among behavioral scientists concerned with the modern human condition: for as Calhoun's rodents moved beyond the boundaries of NIMH and behavioral ecology more generally, escaping into the broader social world and into the popular imagination, they also escaped from his control. While, *professionally*, his work became a (seemingly obligatory) touchstone reference for a wide number of fields ranging from architecture to zoology, the numerous simplistic and sensational popular accounts of Calhoun's work resulted in his association with an unduly pessimistic and cataclysmic vision of man's future in a crowded world, a vision that many chose to counter.⁶ To his growing frustration and dismay, few drew upon his later research, dedicated to ameliorating the ill-effects of crowding. Through the effective design of space, he attempted to develop more collaborative and intelligent rodent communities, capable of withstanding greater degrees of density. For Calhoun, contrary to many interpretations, population growth was not inherently bad and humanity was not destined to destroy itself.

Finally, the paper will explore how, as he struggled to have his message understood and acted upon, the scientific, artistic and popular imaginations began to fuse. Having long been happy to draw inspiration from writers such as H. G. Wells and George Orwell, he increasingly saw his rodent laboratories as providing substantive evidence for the alternative futures these authors imagined. Humanity must undergo a conceptual and “compassionate” revolution, or else (like his rodents) descend to stagnation and death. He mapped the development of his rodent populations, of human cultural evolution, and his own career on to one another.⁷ Just as subordinate rats and mice struggled to find more creative solutions to the problems of increased density, as opposed to their aggressive and conservative superiors, he, like other creative thinkers, had also struggled

professionally. Existing on the boundary between the social and the biological sciences meant that all too often, he existed on the periphery of both. His use of cultural referents to promote a more *positive* vision of humanity's future in a crowded world, met with much less success. With his failure to secure the necessary institutional support to complete his project in the 1980's, Calhoun feared that the pessimistic Orwellian future, with which he had been all too readily aligned, would become a reality.

Density and pathology in science and city

Calhoun began his career as an animal ecologist. Trained in zoology at Northwestern, a number of temporary appointments in biology faculties followed before, in 1946, he moved to the Johns Hopkins School of Hygiene and Public Health. There Calhoun was employed as part of a project looking at ways to control Baltimore's rodent population. Two communities of Norway rats were studied: one in a row of backyards in Baltimore, and the other on Parson's Island in Chesapeake Bay. The contrast between "natural" and man-made settings would prove portentous, providing templates for the Towson enclosure built the following year and for much of his later work.⁸ From 1951 his work was supported by the National Institute of Mental Health; initially in the form of a grant to the nearby Walter Reed Army Medical Center in Bethesda, before transferring to the NIMH's Section on Perception at the Laboratory of Psychology in 1954. Moving out into the fields above Bethesda, Calhoun leased a barn from a farmer where he built the first of his rodent universes. Eventually, he settled in building 112 in an annexe to the NIMH. Initially allowed considerable latitude, he would remain here for most of his career, constructing ever more elaborate universes, ever more ambitious research cycles.

Crowding was the problem to which Calhoun dedicated his entire professional life as a scientist. At Johns Hopkins, he and his colleagues were contributing to a central debate in ecology.⁹ Fathers of the discipline, W. C. Allee and Raymond Pearl in the US, and Charles Elton in Britain, had focused their attention on the rise and fall of population numbers over time; investigating whether these shifts and fluctuations were caused by climate, food supply, predation; or if instead there was some internal regulatory mechanism triggered by increased numbers that would ensure that a species did not outstrip its means of subsistence.¹⁰ A particularly fruitful line of inquiry was developed by ecologist John J. Christian, Calhoun's colleague at Johns Hopkins. Christian turned to Hans Selye's conception of stress: adrenalin for fight-or-flight responses was maladaptive under situations of extreme or prolonged stress, leading to a breakdown in bodily systems.¹¹ This was expressed in a triad of physical changes: adrenal hypertrophy, atrophy of lymphatic structures, and ulceration of the stomach and duodenum.¹² Seeking to identify and replicate the social, physiological, and evolutionary effects of crowding stress in laboratory and field, researchers turned their attention to a host of species such as voles, lemmings, snowshoe hares, sika deer, monkeys, cats, and (of course) rats and mice.¹³

Calhoun, therefore, was not the only researcher interested in the study of density, nor was he solely responsible for the growing interest in its behavioral

Figure 2



John B. Calhoun in "Universe 25." Image courtesy of National Library of Medicine.

effects. The crowd had long been associated with pathology: with mass panic, with the spread of disease, with political radicalism, aggression, and unruly social behavior. Many of these issues had been brought to the fore by contemporary events: the Watts riots of 1965, then again in Newark and Detroit in 1967, prefigured civil unrest across 125 American cities subsequent to the assassination of Martin Luther King in 1968. With these uprisings mirrored on college campuses (most prominently at Columbia), and the reported rise of an anti-authoritarian drug-culture, America looked ready to unravel. Worse still, local collapses of social order seemed part of a wider moral degeneracy, a failure horrifically exemplified by the apathetic non-response of many witnesses to the brutal rape and murder of Kitty Genovese in Queens in 1964. The urbanization of America seemed at least partially culpable for the turpitude and the ensuing dissolution of community ties—all were amenable to being viewed as problems of "the crowd."¹⁴

Meanwhile, the crowd itself was directly associated with the problems of pop-

ulation growth, another subject of concern. America in the decades following the Second World War experienced rapid change and growth as technological progress, catalyzed by the war effort and sustained by a buoyant economy, supplied the citizenry with a surfeit of luxuries. Yet with an improved economy came an accelerated birth-rate, coinciding with an increased shift from rural to urban living. The problem of space seemed urgent, the expansion unsustainable. Housing projects sought to ease the pressure by packing residents into vast concrete hives. Among the most vilified was the Pruitt-Igoe development in St Louis. Erected in 1951 and eventually demolished in 1972, it was a project which rapidly came to symbolize how failures in planning could catalyze social degeneration.¹⁵

It is into this milieu that Calhoun's work emerges, fusing the idea of the crowd as a pathological process, concern about the modern urban individual being overloaded by stimuli, and the belief that all social animals share certain biological needs and societal structures. While most addressing density issues among animals believed that the work had relevance to the human condition (particularly in relating stress to physical pathology), it was Calhoun who made the study of animal crowding behavior his own, and further, made his interest in human behavior explicit. Indeed, from their inception, Calhoun's experimental designs reflected his concern with human populations: his rodent homes resembling high-rise tower-blocks complete with narrow stairwells and congested entrances. These miniature cities seemed to model the world without, and the physical similarities offered a seductive behavioral analogy—here in the rodent universe, many of man's social ills were seemingly explained by the relation between space and numbers.

Central to Calhoun's experimental design was his contention that there exists an upper limit to the number of meaningful social interactions that an individual could cope with before stress became a factor.¹⁶ This innate limit determined a maximum group size—a figure Calhoun set at twelve in both rats and man.¹⁷ As population density increased it became ever more difficult for an individual to control the frequency of social contact. The result was unwanted interaction, leading to adverse reactions such as hostility and withdrawal, and ultimately, to the type of social and psychological breakdown seen during the latter stages in his crowded pens.

Drawing upon Calhoun's work, researchers in human ecology, social psychiatry, social epidemiology, and the new environmental psychology—such as George Carstairs, Aristide Esser, William Michelson, Harold Proshansky, Robert Sommer, and D. H. Stott—identified the problem of density in the city, home, and institution as impinging directly on health and development.¹⁸ The interest was reciprocated by biologists such as Paul R. Ehrlich, who believed that the problems of crowding would help bring population issues to the urban masses. Ecology was not simply concerned with the preservation of the wilderness for the elite, but with eradicating rat-infested slums—the poverty of which correlated with the wealth of numbers.¹⁹

Stimulated by Calhoun's research, it was Ehrlich who encouraged a recent PhD in psychology, Jonathan Freedman, to begin the first laboratory studies of crowding among human beings at Stanford University in the late 1960s.²⁰

These were joined by surveys which sought to correlate density with a variety of pathologies deemed analogous to those found in Calhoun's laboratory.²¹ Social scientists also sought to identify social pathologies in institutions where individuals were collected together for considerable periods of time, such as the prison, the hospital, the college dormitory, and the school.²² These were for the main part young researchers disaffected with the previous generation's failure to deal adequately with the problems of space and numbers, problems with which they were greatly concerned.²³ Seeking to justify this shift in focus, they turned to Calhoun. It seems to have become almost obligatory to begin any study, analysis, or reflection on crowding with a description of (or at least a reference to) Calhoun's now "classic" experiment.

Calhoun actively encouraged interdisciplinarity. One of his first roles at NIMH was to help the psychiatrist, Leonard Duhl, to organize a regular series of seminars which brought together a diverse group of experts. Nicknamed the "Space Cadets", they were united by a concern with the influence of the physical environment on health, behavior and wellbeing.²⁴ Indeed, Calhoun's work was spread over so many bases that the old disciplinary categories seemed oddly inappropriate. Asked to state his disciplinary affiliation in a 1969 NBC television interview, Calhoun flounders momentarily. When the presenter suggests psychologist, Calhoun agrees he could be a psychologist, or an ecologist, or a human ecologist.²⁵ What the interviewer is really interested in is whether Calhoun sees his work as relevant to humans or animals, a distinction to which Calhoun displayed a genial indifference. When it came to zoomorphism—reading animal behavior into the behavior of men—Calhoun made it clear that the burden of proof lay with those who made pre-Darwinian claims for human uniqueness.²⁶ Any resistance to zoomorphism was just another anthropocentrism.

Others agreed, and went further. At the end of the 1960s, popular books by Robert Ardrey and Desmond Morris urged that we view our own behavior in the same way as we view the behavior of animals. They combined Calhoun's work with the growing ethological interest in aggression and territorial behavior.²⁷ Re-describing humans as "naked apes," Morris insisted our inherited habits could not be "civilized-out," and urged we organize society accordingly.²⁸ Much like rats, our "rules" for social interaction "were designed for use in a small, closely knit tribal unit, not in a vast metropolis. In the big city we are constantly intermixing with hundreds of [. . .] strangers. This is something new, and it has to be dealt with."²⁹ Like Morris, Ardrey (playwright turned pop-ethologist) shuttles between animal studies and human social ills, deploying the former to understand the latter. Also like Morris, he singles out the city for special attention: "We face in the urban concentration something new under the sun, something unanticipated. [. . .] we may live in our cities like ants in an ant-hill, as vertebrates we are genetically unprepared for such contingency."³⁰

Exposed to Calhoun's experiments, it was surely difficult to resist making connections between the rodent colonies and the problems of increasingly crowded cities. When Senator Robert Packwood called on the government to consider the problem of population growth in 1971, it was to Calhoun that he turned.³¹ Lewis Mumford draws upon Calhoun in a way that was increasingly common in the 1960s and 70s:

No small part of this ugly urban barbarization has been due to sheer physical congestion: a diagnosis now partly confirmed by scientific experiments with rats—for when they are placed in equally congested quarters, they exhibit the same symptoms of stress, alienation, hostility, sexual perversion, parental incompetence, and rabid violence that we now find in Megalopolis.³²

The particulars in the above quotation reflect two further aspects of Calhoun's research that made it so attractive to a broad, public audience. The first was the sheer range of behavioral pathologies identified and the easily available isomorphism with human culture—hypersexuality, homosexuality, gang-violence, social withdrawal, negligent parenting. The second was his association of these “unnatural” and immoral behaviors with such an unpopular, tainted animal as the rat. Like man, the rat could be said to exist on the boundary between the natural and the unnatural. In the folk-taxonomy that sorts species by relation to humankind,³³ the rat is neither domesticated nor entirely wild; rather it is an unwelcome but perennial cohabitant of the built environment. The rat seemed indigenous to the city, and what made the species so repellent was precisely what made it so successful: thriving where squalor is most pronounced, often to epidemic, plague-like proportions. It is thus unsurprising that when seeking illustrations of the adverse affects of crowding on behavior, it was the *rat*, rather than the vole, deer, or snowshoe hare, which was more commonly chosen by writers. The ready-made cultural taint and untouchable status of rats seemed to amplify the impact of Calhoun's work. And although Calhoun increasingly used mice in his more ambitious experiments, it is nearly always with reference to rats that the work is written about, especially in the more populist formats. Given the cultural climate into which they emerged, it comes as no surprise to find that Calhoun's work is quickly picked up on by the more alert social commentators, journalists, and writers of the day.³⁴

Popular impact of the behavioral sink

Calhoun's experiments appeared in *Scientific American* at a propitious time: interest in crowding was piqued. A receptive audience was assured, and Calhoun's rats swarmed into the public sphere. Calhoun's interest in vice, isolation, disruptive behavior, and social collapse aligns his research with some of the dominant themes of post-war literature. The period following his publication in *Scientific American* sees a rush of popular books and films which rehearsed an apocalyptic view of a future crippled by over-population, many drawing directly on Calhoun's work—books like *Terracide* (1970) by Ron M. Linton; *My Petition for More Space* (1974) by John Hersey; *Make Room! Make Room!* by Harry Harrison, published in 1966 and later filmed as *Soylent Green* (1973, dir. Richard Fliescher); the film *Z.P.G.* (1972, dir. Michael Campus); the novels *Logan's Run* (1967), by William Nolan and George Johnson; *334* (1974) by Thomas Disch; and *Stand on Zanzibar* (1968) by John Brunner. In Anthony Burgess's *The Wanting Seed* (1962), massive overpopulation result in ultra-violence, compulsory homosexuality, hermetic isolation. In Robert Silverberg's *The World Inside* (1970), billions of human beings are contained in vertical cities and the pathology of overcrowding is countered by an oppressive communal ideology that stifles indi-

viduality while celebrating promiscuity. Nor was this type of referencing entirely benign: fictional “cases” were also being used to promote policy. *Voyages: Scenarios for a Ship Called Earth*, an anthology of short stories and extracts focusing on the dangers of population growth, resource depletion, and crowding, was published by the Zero Population Growth movement in 1971.³⁵ Sandwiching the fiction between polemical essays on overpopulation, the ZPG apparently aims to use the imaginative productions of writers including Doris Lessing and J. G. Ballard as *evidence* for the looming threat.³⁶

On the other side of the Atlantic, the British comic book *2000AD*, launched in 1977, bears the imprint of that era’s concern with in dense, violent conurbations. Judge Dredd, the comic’s flagship character, brutally polices massively overcrowded “MegaCities”—urban environments which had exceeded what Calhoun called the “megacrisis,” the point at which the problems of overcrowding became irresolvable. The populations of the megacities live in vast tower blocks, each housing 60,000-plus people. The boredom and claustrophobic overcrowding of future living brought tensions to a knife-edge. The lifestyle causes “distortions in the hypothalamus [sic]”—just like the stressed-out rats in Calhoun’s pens. They become “surly, illogical, violent,” their “pack instinct is stimulated.”³⁷ Anarchy and war result. If those terms seem resonant with Calhoun’s work, it is no coincidence. The writers of *Judge Dredd*, Alan Grant and John Wagner, both recall being alert to Calhoun’s work.³⁸ Grant, especially, cites Calhoun’s experiments as a direct influence, and would later return to the theme—making explicit references to the crowded rats of Calhoun’s experimental universes. In a *Batman* comic written by Grant in 1995,³⁹ a character called “The Ratcatcher” plans to usurp humans and repopulate the world with a breed of self-conscious rats called “*Rattus sapiens*.” At one point, Ratcatcher lectures an audience of rats on an example of man’s brutal treatment of their species: Calhoun’s rodent experiments (note that “universe 133” was actually a mouse experiment, but it is as ever with reference to *rats* that the work is recalled).

The altogether seedier “underground” comic book scene apparently found Calhoun’s work especially appealing. In 1970, a Californian horror comic called *Insect Fear* makes a short run. It’s a garish, Robert Crumb-meets-William Burroughs⁴⁰ affair, suggested “For Adult Intellectuals Only.” The content graphically documents excesses of lust, aggression, and self-abandon in an urban setting. The subtitle is: “*Tales from the Behavioral Sink*.”

Calhoun did much to facilitate such crossovers. The names he gave rodent behaviors resonated with human culture and inner city vice. He used terms such as the “pied pipers” to describe a group of females that followed objects obsessively; obsessive groomers were “beautiful ones;” there were “social dropouts,” “sommambulists” and “autistics” for withdrawn individuals; “probers” or “juvenile delinquents” for the hypersexual and excessively violent; while aggressive females were “Amazons.”⁴¹ When Calhoun called congregations of animals “barflies” or “social drinkers,” the analogy with a crowded bar must have been almost impossible to push out. It sounded like a Hubert Selby, Jr. novel. Indeed, the hopeless cities of Selby’s imagination and the available connections did not go unnoticed—literary critic Tony Tanner made the link between Selby’s vision of urban chaos and Calhoun’s rodent universes: “A good way to describe what Selby is doing is to say that he is trying to depict a human version of what the

Figure 3



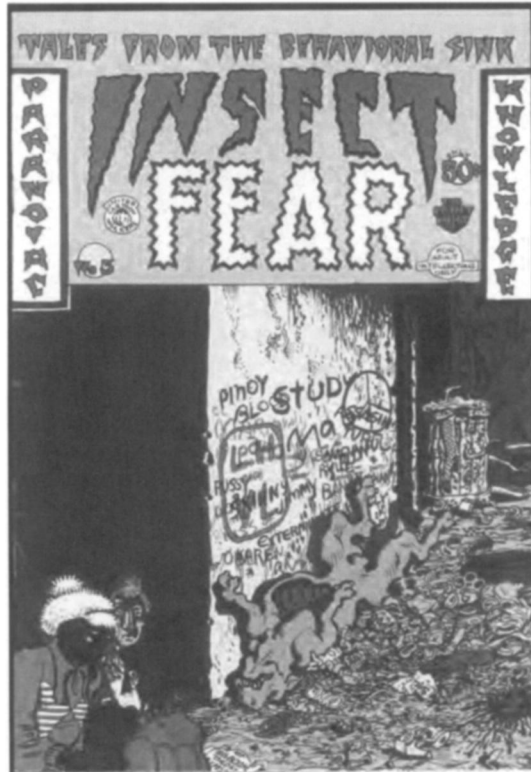
Panels from Grant, Balent and Smith, "Batman: The Secret of the Universe, Part 2," *Catwoman*. Baldwin, NY: DC Comics, 1995, pp. 6–7.

ecologist John Calhoun called a 'behavioral sink.'⁴² The point here is not that Selby has read Calhoun or was consciously trying to write about a human behavioral sink.⁴³ The point is rather that Tanner as an exegete found that Calhoun's work shed light on Selby's writings in ways which he expected readers of Selby would find useful. Understanding Calhoun, Tanner felt, helps us to understand Selby.

Of all the ways that Calhoun's work traveled outside his experimental setting, it would be this phrase—"the behavioral sink"—that was most resonant. Because the term originates with Calhoun, it becomes a marker by which his cultural influence might be charted. And because he chose the phrase quite carefully, we can also see how Calhoun's descriptions of his experiments fed into and encouraged a variety of concerns with the state of the human condition in modern society.

The behavioral sink is not a pathological behavior *per se*, but a sort of parathology, which seemingly appears from, and supervenes upon, the behavior of individual animals within the crowded group.⁴⁴ The way Calhoun describes it, behavior becomes more and more erratic until, eventually, the behavioral sink emerges like a vortex. Thereafter it acts as an accelerant, exacerbating the effects

Figure 4



of the other pathological behaviors: “The unhealthy connotations of the term are not accidental,” Cahloun wrote, “a behavioral sink does act to aggravate all forms of pathology that can be found within a group.”⁴⁵ It is important to note that the behavioral sink was not inevitable, but emerged as a consequence of individual rats and mice becoming so used to contact when eating and drinking that they begin to associate these processes with the presence of others. By altering the feeding arrangements to reduce social contact, Calhoun found he was able to prevent its development. Without the sink, crowding was less lethal, but remained grotesque: infant mortality in severely overcrowded enclosures levels out at about 80%. With a behavioral sink, that figure skips to 96%.⁴⁶ Crowding pathology, therefore, was not dependent upon the behavioral sink, but it seemed to mark a point at which the animals are overwhelmed by the crowding, leading to a societal state-change.

Insect Fear’s use of the term probably came via Tom Wolfe, who wrote an article called “Oh Rotten Gotham! Sliding Down into the Behavioral Sink” for the Sunday supplement of the *New York World Journal Tribune*, later collected

as the last chapter to 1968's *The Pump House Gang*. Wolfe's usage found its way to fellow radical journalist Hunter S. Thompson, who was so enamoured of the phrase that he wrote a letter to Wolfe congratulating him on the collocation and calling it "a word jewel," "a flat-out winner, no question about it."⁴⁷ Wolfe apparently came to the behavioral sink through an interview with the anthropologist Edward Hall, an admirer of Calhoun's work.⁴⁸ How Wolfe then reported it is typical of the manner in which Calhoun's research lends itself to wider arguments against the imminent collapse of American culture, with Wolfe easily describing downtown New York in the same language that Calhoun had used to describe swarming rats, and identifying many of the same pathologies:

Overcrowding gets the adrenalin going, and the adrenalin gets them hyped up. And here they are, hyped up, turning bilious, nephritic, queer, autistic, sadistic, barren, batty, sloppy, hot-in-the-pants, chanced-on-the-flankers, leering, puling, numb . . .
It got to be easy to look at New Yorkers as animals . . . running around, dodging, blinking their eyes, making a sound like a pen full of starlings or rats or something.⁴⁹

If Wolfe's usage of Calhoun seemed to carry the rodent findings over to humanity a little too fluidly, Calhoun didn't appear to disapprove. He would later write of Wolfe's piece:

Ned [Edward Hall] and I share the view that social ideas become effective only after gaining coinage in common parlance. Ned once took a walk through New York City with Thomas Wolfe, a result of which was Wolfe's devoting much of the last chapter of *The Pump House Gang* to my concept of the "behavioral sink". Although Wolfe used a considerable literary twist, many readers must have gotten the notion of traps we unknowingly can get into. Certainly many of these readers would hardly have encountered the idea in a scientific journal.⁵⁰

Although Calhoun is credited with the specific collocation, "sink" had long been used to denote a concentration of moral (rather than just physical) squalor. Along with being a "pool or pit . . . for the receipt of waste . . . a receptacle for filth or ordure,"⁵¹ the OED lists a second sense of "sink" as: "A receptacle or gathering-place of vice, corruption, etc."⁵² —and includes references dating back to the early 16th century. Here then is another sense of *sink*—or a likely site where it might have slipped from naming a topographical low-point to naming an ethical one.⁵³ "Sink" seems to have transferred quickly from referring to the lowest place to the lowest people—"the rascall and vile sort of men: y^e sinke of the citie" (1573)⁵⁴ —and as this quotation suggests, the connection with specifically *urban* corruptions seems to have been present from the start. So the problem was not simply one of numbers, but of organization. In failing to provide adequate spaces for privacy and communality, the *city itself* was complicit—it is the city that crowds the man. Analyzing "Urban Geography and the Human Condition," Jean Gottmann views this as a shift from perceiving the urban dweller as greedy, sinful, and corrupt, to seeing the city itself as the source of that corruption. The inhabitant was a victim of his habitat: "The density, the mass, the congestion, the pollution, the noise, and the turmoil are among

the characteristics deplored in the modern city.”⁵⁵ Calhoun’s description of the behavioral sink not only captured the sense of a city as a destructive force, but further, seemed to explain why it was that such an horrific environment seemingly acted almost as an attractor, drawing and holding such large numbers of people. The process was one of “pathological togetherness,” individuals conditioned to seek out the presence of others, even to the detriment of the self and society.

A complementary sense is presently active in the use of the phrases “sink estate” and “sink schools.” These are derogatory terms used by British journalists to describe the very poorest areas, and act as shorthand for the moral decay and hopelessness that accompanies such poverty. “Sink estate” seems to have surfaced in the 1970s. The earliest reference the OED can find is from the *Daily Mail* (4 October 1972, 25), although it seems that the direct referent isn’t Calhoun (or, indeed, Wolfe, whose new collection of essays had recently been published and would likely be familiar to journalists).⁵⁶ Anticipating talk of “sink estates” and “sink schools,” anthropological literature from the first decades of the twentieth century saw the term briefly appear in a parallel sense. In 1924, one J. R. Swanton proposed “cultural sinks” to name areas where cultural development was stunted; that is, areas of “low” rather than “high” culture.⁵⁷ In 1953, Andrée F. Sjöberg referred to the same as an “ethnographic sink.”⁵⁸ Neither term seems to have caught on, and in 1956, William W. Newcomb, Jr. wrote an apparently decisive rejection of “sinks,” finding the term both unhelpfully vague and unpleasantly evaluative:

It is difficult to know what Swanton meant by cultural “sink,” although he said he was borrowing “a geological term.” The connotation this phrase has for me is that of a depressed area into which flows by some mysterious means the dregs and the cultural offal of neighboring areas.⁵⁹

Newcomb’s impression of what a “cultural sink” might mean explains at once what makes the term repellent to post-Boasian anthropologists and yet attractive to the cultural pessimists of the 1970s. Calhoun, of course, hadn’t used “sink” to talk about human culture, but of rats—hence Calhoun’s “sink” escaped the sort of censure that Swanton’s use was exposed to. By mooring the “unhealthy connotations” of the sink in rodent studies, Calhoun provided an opportunity to employ this sort of language in a permissible setting—that is, *merely* analogically. Unlike Swanton, who was judging and ranking *human* cultures, Calhoun was simply describing animals.

Thus Calhoun’s choice of the phrase was canny for a number of reasons. He had tapped into an extensive etymological precedent linking *sinks* with both cities and entropy; and at the same time, made available a term which (though evocative) was previously anathema when used anthropologically on account of the chauvinistic overtones of “low” and “high” culture. There was no similar taboo on talking of a sink of rats. Added to this, of course, the term appeared in an intellectual climate sympathetic both to Calhoun’s manner of zoomorphism, and pessimistic about the problems of overpopulation and urban decay. The term’s success might then be understood as a “perfect storm” confluence of these factors. And the result, in Thompson’s phrase, was “a word jewel.”

Backlash

We have seen how Calhoun's research and language captured the imagination of both scientists and the public. Yet even as he was being favorably cited in the national press and in syndicated newspaper stories, specialist voices within the academy began to signal a swell of dissent. It is difficult to establish if this growing backlash was motivated by the popularity of Calhoun's rodents, but what can be shown (as we shall now examine) is that complainants drew upon the *popular*, and thus pessimistic—even apocalyptic, image of Calhoun's work.

Certainly, those who felt uneasy at Calhoun's growing influence were aided by inconsistencies in the results of researchers seeking to identify and replicate crowding pathologies among human populations. While several studies established positive correlations and associations between density and pathology, others did not, and some even identified an inverse relationship.⁶⁰ Urban sociologists Claude Fischer, Mark Baldassare, and Richard Ofshe, argued that inconsistent results were to be expected, the inevitable result of "Calhoun's rats . . . pulling a fast-moving bandwagon."⁶¹ The "cities-are-teeming-behavioral-sinks" debate had encouraged researchers to approach society armed with simplistic pathology check-lists.⁶² However, if they expected to uncover evidence of humans going "berserk," they were sorely mistaken: Calhoun (they alleged) was guilty of anthropomorphism, and his case for uncovering a law of numbers common to both human and non-human animals built upon loose analogy. Calhoun had long encountered such responses. Following his presentation to the Royal Society of Medicine in 1971, he was admonished by his chair, J. Z. Young, for carelessly extrapolating from mice to men.⁶³ By the late 1970s, however, such criticisms were intensifying. While rodents may have struggled in the utopias that Calhoun had constructed, social scientists⁶⁴ argued that human capacities for culture, social organization, and technological innovation, ensured that they were capable of coping with crowding. Calhoun was still being referenced, but increasingly for illustrative purposes, a means of capturing the reader's attention when addressing the problems of space and numbers. Direct relevance to man was less frequently admitted.

Popularisations of Calhoun began to work against him. In Freedman's influential book of 1975, *Crowding and Behavior*, criticism of Calhoun was fused with an assault on the "pop-ethology" of Morris and Ardrey. This was no doubt spurred by the tendency of such populist accounts to omit reservations about the transferability of Calhoun's animal studies—Morris here is exemplary: "if our populations go on increasing at their present terrifying rate, uncontrollable aggressiveness will become dramatically increased. *This has been proved conclusively with laboratory experiments.*"⁶⁵ Fischer and Baldassare associated Calhoun's work with "best-selling books and popular novels" whose "torrent of dramatic prose has portrayed men as 'killer apes,' trapped in the 'human zoo' that we once called the city."⁶⁶ Zlutnick and Altman surveyed the numerous newspaper and magazine articles on crowding, through which, they suggested, Calhoun's speculative hypotheses had been alchemized into scientific *fact*.⁶⁷ As Calhoun's work became increasingly caricatured, reduced to a simple causal claim—"increased density leads to pathology," so it began to assume the role of a "modern folk-myth," more useful as a gauge of society's fears than as a source of information for planning

purposes.⁶⁸ As such, Calhoun was also seen to hold a dark and pessimistic vision of humanity's future in a crowded world. His work was not only flawed, it was dangerous. In the words of Fischer and Baldassare: "A red-eyed, sharp-fanged obsession about urban life stalks contemporary thought."⁶⁹ Calhoun's work had precipitated an unwelcome assault on urban living, an assault that needed to be repelled. To this end, Freedman concluded *Crowding and Behavior* with a chapter entitled "In Praise of Cities" where he extolled the benefits of high density living. Fischer, meanwhile, was a leading exponent of a revised "subcultural theory," which proposed that areas of high density allowed for the development of deviant subcultures that, while often exhibiting pathological behavior, simultaneously fostered community, innovation, and creativity.⁷⁰ Further, in focusing upon density as the central problem, other causes of urban pathology, such as poverty and inequality, were being ignored. Jettisoning Calhoun had advantages, as Freedman argued: "If the world cannot conveniently blame its problems on overcrowding, it will be forced to look elsewhere for the causes."⁷¹

Criticism of Calhoun's apparent willingness to uncritically traverse species boundaries was understandable. In a review of the crowding literature, Gunter Gad commended animal researchers for their care in *not* extrapolating their findings to human beings. Calhoun, in contrast, was censured for failing "to resist the temptation."⁷² As we have seen by the language that Calhoun used, where other researchers might be careful to minimise the possibility of anthropomorphism, he seemed at times to positively encourage it. He often made direct comparisons between his animal pathologies and those present among human beings: "probers" were like "juvenile delinquents," the aggression of mothers towards pups was comparable to the "battered child" syndrome, and withdrawal to "autism."⁷³ When responding to J. Z. Young's criticism in later work, he did not seek qualification or caveat, but made another inferential leap, comparing his pathological rodents to the Ik of Uganda. As documented by Colin Turnbull, Ik society was characterized by immense cruelty, even towards children.⁷⁴ This was the effect, Calhoun argued, of being moved off their land and out of small hunter-gatherer bands into larger, permanent villages. Their culture and social organization could not stand the strain of increased density: "The Ik failed to remain human," Calhoun concluded, "I have put mice to the same test and they failed to remain mice."⁷⁵

Associating Calhoun with extreme pessimism was also entirely comprehensible. He had, after all, described his rodent universe as "Utopian": "a 16-unit high rise apartment, an always replete cafeteria . . . no epidemic disease, no famine."⁷⁶ With its subsequent descent into "hell," he seemed to be questioning by extension the viability of the welfare democracy—the more resources we supplied to the population, the more profound our problems became. Any attempt to realize social equality seemed doomed from the start. Even though Calhoun's use of inbred strains ensured that his rats and mice were genetically alike, not only was social hierarchy inevitable, but it became increasingly destructive with increased density: those at the top of the social hierarchy resorting to violence, those at the bottom, to withdrawal.⁷⁷ In explaining this, he was drawn to the language of Orwell: "ALL ANIMALS ARE EQUAL—BUT SOME ANIMALS ARE MORE EQUAL THAN OTHERS."⁷⁸ (It was a connection he would return to with increasing frequency.) In other ecological studies, social hierarchy

helped maintain population stability, with the weaker animals pushed to the edge of an ecological range, restricted in access to mates and suffering greater degrees of morbidity and mortality. For Calhoun, however, such ecological ideals as “carrying capacity” or “balance of nature” no longer applied to the human species, just as they no longer applied to his rats and mice. When growth passed a certain threshold, a population supplied with adequate resources did not merely decline to a lower density; it became extinct. Behavioral norms and social roles that once held a society together now undermined it: violence became more acute, withdrawal more severe. In other words, we’d go mad long before we’d starve; we’d kill one another long before hunger killed us. Malthus seemed moot.

Calhoun even adopted the “doomsday” predictions of the cybernetician Heinz von Foerster.⁷⁹ Based upon an extrapolation of mankind’s ever-increasing rates of reproduction, von Foerster had “calculated” that population growth would become infinite on Friday 13 October 2026. To avoid this eventuality we could, following the advice of the Zero Population Growth movement and von Foerster himself and introduce legislation to restrict fertility to replacement level, two children per couple. For many, this was the logical conclusion to be taken from Calhoun’s research: as population density would inevitably result in social breakdown, the solution was to reduce the number of people (a process involving an equally chilling range of oppressive policies).⁸⁰

Creating “cultured” rats: Calhoun as an optimist

So far, we have seen how Calhoun’s experiments captured the popular imagination, and how his choice of language played out of and into key cultural referents; and how, finally, this very popularity was used *against* him by those seeking to reaffirm the animal-human divide and to counter the apparent pessimism of Calhoun’s perspective. Clearly, in the case of Calhoun’s experiments, the boundary between the popular and the scientific, and between fact and fiction, was easily and often transgressed; aiding but also *restricting* travel into different social worlds. Indeed, as we shall now examine, the very success of Calhoun’s experiments in connecting to the concerns and fears of a generation meant that the description of his work in both popular and scientific literature was all too often a simplified version which overshadowed the more nuanced and positive message he wanted to spread.

Calhoun challenged directly the “dismal theorem” of Paul R. Ehrlich in which each additional human was perceived as having a negative impact on the environment.⁸¹ Man was a “positive animal,” for whom the pressures of density had driven innovation and social complexity, leading to a division of labour and new social roles. Thus, as *physical* space declined, man was forced to extend his “*conceptual* space”—the network of ideas, technologies—enabling more efficient use of resources while ensuring that each individual maintained a limited number of meaningful social interactions.⁸² This allowed for increased population growth, with the process governed by a series of positive feedback mechanisms. There was of course a limit to both numerical and conceptual growth, beyond which our social and physical infrastructure would be overrun, but if the population were to be stabilized at the present density, human potentiality would stagnate:

“every role vacated will be filled precisely by a similar one. Such stability and predictability have rarely been the way of evolution over any protracted period of time. Stable products rarely last.”⁸³ Our conception of “utopia” as an environment in which the basic requirements of the population were met and social hierarchy obsolete, failed to account for social, biological, and psychological needs: the border between utopia and dystopia was not merely fine and easily crossed, it was fictitious. As he stated in an interview: “Human beings thus face a predicament: If we try to make everybody totally happy, we’ll destroy mankind.”⁸⁴

Calhoun believed that the innovations, technological and cultural, stimulated by population growth would allow for a further “communication-electronic revolution,” and again found Orwell a useful point of reference. Having initially predicted this “revolution” would take place in 1988 (the point where existing communication networks would prove ineffective in the face of increasing physical and conceptual density), he later altered this date to 1984 in “deference” to Orwell’s premonition of the dangers inherent in these new powers of control.⁸⁵ Like Orwell, however, Calhoun was not suggesting that the alternative futures of stagnation or extinction were inevitable. 1984 was a warning of a possible future, but there was an alternative, one that harnessed the positive potential of population growth while ensuring future survival. In seeking such a solution, Calhoun returned to his rats and mice.

In his early experiments in the outdoor pens, Calhoun had witnessed a creative act by his rats that he likened to the discovery of the wheel by man: when building a new burrow they did not simply dig out the dirt as they went, as any normal rat would do, instead they packed it into a large ball which they then rolled out.⁸⁶ This innovation had not come from the socially dominant animals but from a highly disorganized and predominantly homosexual group of subordinates, partially withdrawn from the larger social organization. As Calhoun saw it, the repression they had suffered at the hands of their superiors had resulted in deviant, *creative*, and thus *adaptive* behavior.⁸⁷ Inspired by this example, in his laboratory at NIMH, Calhoun attempted to design rodent universes that would both *stimulate*, resulting in “creative deviants,” and *ameliorate*: removing the worst excesses of crowding pathology. Through a variety of methods, such as operant conditioning and determining which of the mice and rats could eat, sleep, live, with whom, he sought to design ever more intelligent and collaborative rodent communities, capable of withstanding ever greater degrees of density.

Just as the pathologies his rodents had so reliably exhibited could be mitigated by improvements in the built environment, so too with man. Calhoun urged that “no single area of intellectual effort can exert a greater influence on human welfare than that contributing to better design of the built environment.”⁸⁸ While the specific design of cities, buildings, and institutions he left to architects and planners, he ensured that the “psycho-ecological” perspective was basic to this process.⁸⁹ Meanwhile, Calhoun dedicated himself to a different kind of design: the design of social, intellectual, and information networks. He was convinced that the problem of adapting to the new pressures imposed by an increasingly urbanized built environment could be solved only if channels of communication were arranged in such a way that access to the relevant information was not in-

hibited by disciplinary and institutional structures. But in seeking to explain his optimistic vision, Calhoun—having been long referenced by fiction writers—now increasingly came to explain his own ideas with reference to fiction. To many observers, it must have looked as if the tide of influence had begun to flow the other way.

It had been 1968, Calhoun recalled, when he first realized that the “portent of change” he saw “could not be clarified without building an incipient ‘World Brain.’”⁹⁰ The direct referent here is H. G. Wells’ visionary story which imagines all human knowledge made accessible through aggregation in a pre-digital “supercomputer.”⁹¹ Calhoun suggested organizing scientists into a global, intercommunicating network composed of independent but interconnected groups and sub-groups—only then could the necessary conceptual growth to avoid a catastrophic sink be achieved. He claimed it was “toward a concern with science as a world system which must be understood if the human race is to survive.”⁹² Developing yet another analogy with science fiction, Calhoun referred his readers to physicist-turned-author Leo Szilard’s “Calling All Stars,” where the distant planet *Cybernetica* is populated by 100 interlinked computer “minds” whose connectedness results in rapid cognitive progress. In Szilard’s story, the limits of physical space had been surmounted by conceptual expansion.⁹³ Calhoun uses it almost as proof of possibility. He saw the attempt to defer social pathology as the centerpiece and real import of his work. It was through this growth in conceptual space—enabled by the design of new buildings, new technologies, new social and intellectual networks—that humanity was presented with a more desirable future: what Calhoun called “Dawnsday” in opposition to von Foerster’s “Doomsday.” Here was the profit, the positive signal from the noise of the behavioral sink.

If employing fiction in this way was unlikely to impress the scientific community, Calhoun only compounded the breach by increasingly writing in an autobiographical mode. As he charted his alternative and optimistic future for humanity, the parallel between his own life and those of his “creative deviants” seems to have become more and more compelling. He often described his struggle to find a permanent position in science as having given him the advantage of the outsider and the generalist. Just as with his creative deviant rats, “[o]ut of pathology came progress, new freedoms of action. . . . Losing one’s job, having it come to an end, is a kind of failure. My job at Hopkins [came] to an end . . . that placed my thinking and behavior in some turmoil.”⁹⁴ Yet the “exhaustion, isolation, and despair all contributed to the churning of rational ideas and perhaps irrational hallucinations.”⁹⁵

He went further. Just as his withdrawn and deviant rats were comparable to the creative scientist’s tendencies towards “uncertainty, spontaneity, waste, tolerance, and variability,” the behavior of dominant animals could be compared to “normal” and “conservative” science which celebrated “efficiency, order, yield, power, and conformity.”⁹⁶ Drawing from Kuhn’s model of scientific revolutions, Calhoun self-consciously presented his work as “artistic” as opposed to “normal science.”⁹⁷ It was crucial that the insights of those (such as himself) existing on “a frontier of science, a zone of tension and change between traditional systems of thought,” be subsumed within the broader whole. The creative solutions that emerged among those on the periphery needed to travel across hierarchies, disci-

plines, and, in this case, species. While the limited social structures and biological templates of the rat or mouse restricted this transfer, not so with man. Therefore, Calhoun's rat and mouse universes not only provided a vision of the future destruction of humanity, but pointed to the potential for further evolution.⁹⁸

But institutional support for these research programmes was not forthcoming. Profitable grants for the development of "mood drugs" meant that the type of behavioral cures Calhoun proposed had gradually fallen out of favor. By 1981, William Mayer, of the Alcohol, Drug Abuse, and Mental Health Administration, was able to declare that "N.I.M.H. is drugs, period."⁹⁹ Behavioral studies could highlight the problems, but their solutions would only be found in neuropharmacology—in Ritalin, in Prozac. In 1983, the decision was taken to terminate Calhoun's contract—one year before the competition of his research cycle, and teasingly close to 1984. Casting himself as Winston Smith, Calhoun began to find echoes of 1984's oppressive bureaucracy in the nested structure of the American health system. In August of 1986, on the cusp of his forced retirement, he composed a piece called "A 'Hitchhiker's Guide' to Three Worlds: Fused in 1986 (?)." Abandoned at manuscript stage, it included a braided chronology, "Sign Posts Through 40 Years."¹⁰⁰ This featured three timelines, labeled "Orwell," "NIMH," and "Calhoun," each calibrated against the other for a series of "significant" dates. There is bitterness here with his perceived mistreatment at the hands of an organization that no longer cares for behavioral science and has (he believes) shifted away from trying to help and liberate people and towards trying to suppress and control them: "No longer is there any reason why we should try to understand how our relations with our fellows derail our ability to make choices, to seek fulfilment; 'neuroscience [technology]' alone knows what people should be, [and] can see [to it] that they so become."¹⁰¹ Calhoun submitted a letter of resignation on 30 July 1986. On hearing no reply from the authorities, he wrote: "Why should 'The Leader,' the most powerful Director IRP, NIMH (did I hear the name O'Brien?) pass his decisions up (or was it down?) the bureaucratic ladder. / 1986 is '1984.' C'est finis."¹⁰²

Discussion: Managing the reputation

In this paper, we have explored how the public awareness of Calhoun's experiments, disseminated through expository popularizations, journalism, science fiction, and even comic books, came to impact upon its reception and use among behavioral scientists. Popular presentations have little room for nuance, and the "sound-bite" version of Calhoun's work was that crowding caused madness, period. We have also seen that Calhoun felt his work not only identified the symptoms and diagnosed the disease of modern society, but that it also pointed the way towards a cure. Yet his later experiments, concerned with trying to improve the lot of the crowded, receive far less attention—both from the popularizers, and from the professional and specialist communities on which he had initially made such an impact. It was a simplified version that aided Calhoun's original success, but the tax on this was that it was only the simplified version that people were willing to acknowledge.

There are suggestive parallels here with Jane Gregory's work on astronomer Fred Hoyle, and these are worth exploring for the similarities—the ways in

which Gregory's work can inform our understanding of what happened to Calhoun's reputation—and for the ways in which our story about Calhoun differs.¹⁰³ In Gregory's account of Hoyle's gradual marginalization and exclusion, an eminent but increasingly radical scientist finds he isn't being taken seriously by fellow scientists, so (as the field moves on) he is forced to seek other means to promote his work. He chooses to do so through ever-more populist formats: from general interest science magazines through to science fiction novels. Hoyle is entirely serious about the content, and seeks in this way to employ the fiction as a means of promoting his work, and to control (and *retain* control) over his popular image. As Gregory has it, "while Hoyle might . . . have seen a distinction between his science and his fiction, he also . . . made explicit links between the two . . . to capitalize on the authority of the one and the scope of the other."¹⁰⁴ Hoyle is at the forefront of the popular work—actively employing the mass media and fiction in an attempt to manipulate opinion and have his ideas presented to as broad an audience as possible.

Calhoun is in this respect a very different case. Here is someone whose work becomes extraordinarily appealing to a popular audience. His early experiments capture the public imagination, and (at least initially) he is complicit in that—seeking to promote his work in popular media, and phrasing his findings in (anthropic) terms immediately transferable and strikingly resonant with the popular concerns of the day. However, the pessimistic conclusion that is disseminated and promoted as a result of this process was only half the story that he wanted to spread. Calhoun agreed that crowding caused horrific consequences and even that overpopulation was likely, but he did not agree that humanity was doomed. On the contrary, he had an ameliorative intent: he thought his experiments underlined the need for a revolution in the way we organise our societies and our cities—and that embedded within his experiments was a possible solution. However, in the furore surrounding the grim spectacle of the "behavioral sink," Calhoun found that his ameliorative message was drowned out—everyone wanted to hear the diagnosis, no one wanted to hear the cure. Popular culture picked up Calhoun's message, but only selectively. When comic books, novels and films alluded to Calhoun's work, they did so almost exclusively with regard to the negative message. The sensationalist reporting he received (in which, as mentioned, he was at least partially complicit) came to define his public image and in turn the image that fellow scientists had of him. He was tainted, stigmatized almost, by the behavioral sink. It was a reputation he would struggle to slough off.

So unlike Hoyle, who acted as steward to his public representation, Calhoun found that the popular material had slipped out his control. Meanwhile, the association in the minds of fellow scientists of Calhoun with popularisations and science fiction was only further cemented as Calhoun himself increasingly came to use fictional references to explain his increasingly ambitious and increasingly radical research cycles.

Coda

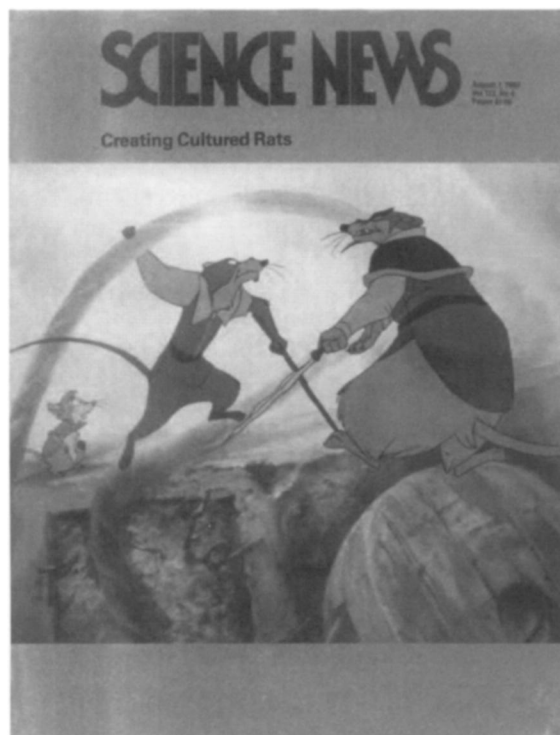
There was, however, at least one place where the positive message of Calhoun's work reached a popular audience. In 1971, Robert Conly (under the

pseudonym O'Brien) had published a children's novel, *Mrs Frisby and the Rats of NIMH*. The book told how a group of hyper-intelligent rats cooperate to help save the home of a family of mice. The rats were escapees from the laboratories at the National Institute of Mental Health. Ten years later, the story (now re-titled *The Secret of NIMH* and appended with supernatural elements absent from the original novel) was made into a successful animated film by Don Bluth. This revived interest in Calhoun's work, with newspaper articles and magazine features using the film as a peg for stories about Calhoun's attempts to create more intelligent and adaptable rodent communities at NIMH. In 1982, *Science News* wrote an article called "The (Real) Secret of NIMH," which began—in typical fashion—"Pure fantasy, the stuff of summer movies.—Or is it?"¹⁰⁵ Although the article was based around a brief interview with Calhoun, its author, Wray Herbert, remained reasonably cautious about Calhoun's influence on the movie: "the origins of the original story have been obscured in time," he wrote, but conceded that "several clues indicate that it was based closely on the work of NIMH psychologist John B. Calhoun."¹⁰⁶ At about the same time, a *Washington Post* article on the creation of highly intelligent rats—again called "Rats! The Real Secret Of NIMH"—regarded Calhoun's work as prescient: "NIMH was another instance in which science fiction, even in a child's story, anticipated science fact." But whilst conceding that "the book . . . did have some of its roots in genuine rat research at NIMH," the piece remained sceptical about the potential of Calhoun's work to have created rats as smart as those in Conly's story. The *Washington Post* article reported that Calhoun remembered Conly visiting the lab in the late 1960s, and even suggests that Mrs Frisby's name is taken from the blue Frisbee hung behind the lab door.¹⁰⁷ Calhoun clipped and annotated the *Post* article. In the margins, he has written that his own copy of *Mrs Frisby and the Rats of NIMH* "includes many notes of so many parallels" that Conly "must have visited his research lab—bldg. 112 NIHAC." He seems to have collected these notes together for the journalist from *Science News*, who includes such unlikely details as the use of identical carrying cages and the fact that the dominant rat in Calhoun's early studies and Nicodemus, the leader of the Rats of NIMH, were both blind in one eye.

Was Calhoun a direct influence on Conly's book? It's difficult to tell. Calhoun clearly thinks so, though Conly himself, apparently, remained silent on the topic. He had been a journalist at *National Geographic* during the nineteen sixties, and it is likely he would have been exposed to Calhoun's work at some point. Calhoun had headed-up the laboratory at NIMH during the same period. And Calhoun *had* tried to create "super-rats," of a sort: one of the ameliorative aims of his research was to condition rodents to tolerate the crowded environment, facilitating dramatic conceptual growth. He writes: "I propose to make the rats in my contrived environment comparable after five years to apes in their natural environment." "In essence, I propose to make an ape out of a rat."¹⁰⁸ These, then, are the rats of NIMH. These are the rats who will show us how to adapt to the crowded modern cities, and how to avoid the dystopian future of the population boom.

Keen as Calhoun was to point to this as a way in which his positive message might be spread, *The Rats of NIMH* was only a children's book and animated movie. As such, this meant that the message was not taken seriously. It was

Figure 5



Cover of *Science News*, August 1982, Showing a still from *The Secret of NIMH*. Note that even when the article is focused on “cultured rats,” the image displayed is one involving aggression.

“the stuff of summer movies”—popcorn nonsense, a distraction. By comparison, material for an adult market—the novels, the books, the more respected journalists and cultural commentators such as Wolfe and Thompson and Ardrey and Morris—was taken more seriously (and as the ZPG’s *Voyages* compilation shows, could be used as persuasive), but embodied only the negative, destructive message of the behavioral sink. The negative message was a real and dire future; the ameliorative message was a fantasy. There’s an asymmetry here, too: beside the spectacle of the behavioral sink, any cognitive advances achieved by the crowded rats seemed insignificant. With the notable exception of Conly’s *Rats of NIMH*, the positive gains were largely ignored, and the status of the rat was certainly never elevated by these similarities. Rather than make the rats seem more like humans, Calhoun’s experiments simply had the effect of making humans look more animal, more debased, more corrupt.

Calhoun had carefully packaged his work to maximize its appeal, but the runaway popularity that followed meant that his reputation was created for him. Despite his insistence that his work ultimately embedded a positive message, he

instead came to be associated with the pessimism he was cited as corroborating. Meanwhile, that he was prominently employed by figures such as Ardrey and Morris and Wolfe had the unfortunate effect of making his work seem of a part with theirs: which is to say, of merely popular interest, lacking scholarly rigor. For Calhoun's willingness to cross species borders was matched by a similar disregard for disciplinary borders. Describing him as "a maverick's maverick in the field of psychology," Ardrey praises him for just this willingness to take ideas outside their specialism: "Calhoun is blessed with the capacity of slipping through the formidable fences of American psychology."¹⁰⁹ Consequently, Calhoun's "maverick" promethean willingness to share specialist knowledge with those outside the "fences" seems illicit, not so much sharing as smuggling.¹¹⁰ Although he saw himself as existing at the nexus of many fields of inquiry, ultimately, he came to seem only on the periphery of each. Despite Ardrey's characterization of Calhoun as an intellectual escapist, given how little control Calhoun ultimately has over his reputation, it seems more accurate to say that it was only his rats which slipped through the fences. Calhoun, then, suffered from his early success. He had ridden a "fast-moving bandwagon" but one which he was not steering. As the rats escaped from his lab, they escaped from his control, and left exposed to the exigencies of popular taste, only the most corrupt of his progeny thrived.

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ENDNOTES

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1. A quarter acre is little over 1000 square meters, meaning each rat would have to itself an area of only about 2000 square centimeters, roughly the size of an individual laboratory cage.
2. Halsey M. Marsden, "Crowding and Animal Behavior," in Joachim F. Wohlwill and Daniel Carson, eds., *Environment and the Social Sciences: Perspectives and Applications* (Washington DC, 1972) 5–14, 9.

3. John B. Calhoun, "Population Density and Social Pathology," *Scientific American* 306 (1962): 139–148. Calhoun reflects on this influence in: Calhoun, J. B. C. 1979. "Employee's contribution to the Performance Assessment of his Scientific Service. [Draft.]" 4 December. John B. Calhoun Papers, Box 45 1954–1986. Located in: Modern Manuscripts Collection, History of Medicine Division, National Library of Medicine (hereafter NLM), Bethesda, MD.
4. Roger R. Hock, *Forty Studies That Changed Psychology: Explorations in the History of Psychological Thought*. 5th Edition (New York, 2004).
5. Amos H. Hawley, "Population Density and the City," *Demography*, 9, (1972): 521–522.
6. See John Burnham, *How Superstition Won and Science Lost: Popularizing Science and Health in the United States* (New Brunswick, NJ, 1987), for an account of the deleterious effects of sensationalism in popular presentations of scientific material.
7. The history, philosophy and sociology of science are only just beginning to explore the ways in which scientists become attached to their work and experimental organisms to the degree that it influences individual subjectivity and identity. See for example Rhodri Hayward, "The Tortoise and the Love-Machine: Grey Walter and the Politics of Electroencephalography," *Science in Context* 14 (2001): 615–641 and Sabina Leonelli, *Weed for Thought: Using Arabidopsis thaliana to Understand Plant Biology* (PhD Thesis, Vrije Univeriteit Amsterdam, 2007).
8. See J. B. Calhoun, "A Method of Self-Control of Population Growth among Mammals Living in the Wild," *Science* 109 (1949): 333–5, "The Study of Wild Animals under Controlled Conditions," *Annals of the New York Academy of Science* 51 (1950): 1113–22, and *The Ecology and Sociology of the Norway Rat* (Bethesda, MD, 1963).
9. For a history of the Rodent Ecology Project, see Christine Keiner, "Wartime Rat Control, Rodent Ecology, and the Rise and Fall of Chemical Rodenticides," *Endeavour* 29 (2005): 119–125.
10. For histories of ecology as a discipline, see Sharon E. Kingsland, *Modeling Nature: Episodes in the History of Population Ecology* (Chicago, 1985), and *The Evolution of American Ecology, 1890–2000* (Baltimore, 2005), and Gregg Mitman, *The State of Nature: Ecology, Community, and American Social Thought, 1900–1950* (Chicago, 1992).
11. John J. Christian, "The Adreno-Pituitary System and Population Cycles in Mammals," *Journal of Mammalogy* 31 (1950): 247–59, and "Phenomena Associated with Population Density," *Proceedings of the National Academy of Sciences of the United States of America* 47 (1961): 428–449.
12. Russell Viner, "Putting Stress in Life: Hans Selye and the Making of Stress Theory," *Social Studies of Science* 29 (1999): 391–410.
13. See Dennis Chitty, "The Natural Selection of Self-Regulatory Behaviour in Animal Populations," *Proceedings of the Ecological Society of Australia* 2 (1967): 51–78, and *Do Lemmings Commit Suicide? Beautiful Hypotheses and Ugly Facts* (New York and Oxford, 1996); Christian and David E. Davis, "Endocrines, Behavior and Population," *Science* 146 (1964): 1550–60; Paul Leyhausen, "The Sane Community—A Density Problem?" *Discovery* 26 (1965): 27–33; Robert L. Snyder, "Reproduction and Population Pressures," in E. Stellar and J. Sprague, eds., *Progress in Physiological Psychology* (New York, 1968);

Charles H. Southwick, "The Biology and Psychology of Crowding in Man and Animals," *The Ohio Journal of Science* 71 (1971): 65–72; Vero C. Wynne-Edwards, "Self-Regulating Systems in Populations of Animals," *Science* 147 (1965): 1543–48.

14. W. Horsley Gantt, psychiatrist at Johns Hopkins University, contributed the failure of the numerous witnesses to help Kitty Genovese, or even phone the police, to the stress of overcrowding in the city (*The Cedar Rapids Gazette*, 27 January 1965). The social demographer David Heer also suspected that the murder "may illustrate," in part, "the type of social pathology occasioned by high population density." Heer *Society and Population*, Second Edition (Englewood Cliffs N.J., 1975), 41. For links made between crowding and urban violence there is a useful review paper by J. S. Adams, "The Geography of Riots and Civil Disorders in the 1960s," *Economic Geography* 48 (1972): 24–42; while G. M. Carstairs, "Overcrowding and Human Aggression," in H. D. Graham and T. R. Gurr, eds., *Violence in America: Historical and Comparative Perspectives* (New York, 1969), made direct links between the pathological effects of overcrowding in animals and urban riots in his report for the National Commission on the Causes and Prevention of Violence.

15. A. R. Gillis, "Strangers Next Door: An Analysis of Density, Diversity, and Scale in Public Housing Projects," *Canadian Journal of Sociology*, 8 (1983): 1–20.

16. Calhoun, "Space and the Strategy of Life," in Aristide H. Esser, ed., *Behavior and Environment: The Use of Space by Animals and Men* (New York, 1971) 329–387.

17. Calhoun, "The Social Use of Space," in W. Mayer and R. van Gelder (eds.) *Physiological Mammalogy* (New York, 1963) 1–187, and "The Role of Space in Animal Sociology," *Journal of Social Issues* 22 (1966): 46–58.

18. See G. M. Carstairs, "Over-population and Mental Health," in H. Regier and J. B. Falls, eds., *Exploding Humanity: The Crisis of Numbers* (Toronto, 1969); Aristide Esser, "Experiences of crowding: Illustration of a paradigm for man-environment relations," *Representative Research in Social Psychology* 4 (1973): 207–218; William Michelson (1970), *Man and His Urban Environment* (Reading, MA, 1970); Harold Proshansky, William M. Ittelson, and Leanne G. Rivlin, eds., *Environmental Psychology: Man and His Physical Setting* (New York, 1970); Robert Sommer, *Personal Space: The Behavioral Basis of Design* (Englewood Cliffs, NJ, 1969); D. H. Stott, "Cultural and Natural Checks on Population Growth," in Ashley Montagu, ed., *Culture and the Evolution of Man* (New York, 1962) 355–376. The combination of environmental psychology, urban sociology and environmental design is described as the "new environmentalism"—J. H. Bradbury, "Walden Three: New Environmentalism, Urban Design and Planning in the Nineteen Sixties," *Antipode*, 8 (1976): 17–28. Its emergence in the late 1960s is reflected in the founding of the *Environment & Behavior* in 1964, and *Environmental Design Research Association* in 1968, followed by the journals *Man-Environment Systems* and *Design and Environment* in 1970.

19. Paul R. Ehrlich, "Overcrowding and Us," *National Parks Magazine* (1969): 10–12, and Ehrlich and John P. Holdren "Impact of Population Growth," *Science* 171 (1971): 1212–1217.

20. Jonathan L. Freedman, *Crowding and Behavior* (San Francisco, 1975).

21. See Omer R. Galle, Walter R. Gove, and J. Miller McPherson, "Population Density and Pathology: What are the Relations for Man?" *Science* 176 (1972): 23–30; A. R. Gillis, "Population Density and Social Pathology: The Case of Building Type, Social Allowance

and Juvenile Delinquency," *Social Forces* 53 (1974): 306–14; Halliman H. Winsborough, "The social consequences of high population density," *Law and Contemporary Problems*, 30 (1965): 120–126.

22. See Andrew Baum and Stuart Valins, *Architecture and Social Behavior: Psychological Studies of Social Density* (Hillsdale NJ, 1977); Corinne Hutt and M. Jane Vaizey, "Differential Effects of Group Density on Social Behavior," *Nature* 209 (1966): 1371–72; Paul Paulus, Verne Cox, Garvin McCain, and Jane Chandler, "Some Effects of Crowding in a Prison Environment," *Journal of Applied Social Psychology* 5 (1975): 86–91.

23. Irwin Altman, "Crowding: Historical and Contemporary Trends in Crowding Research," in Andrew Baum and Yakov M. Epstein, (eds.) *Human Response to Crowding* (Hillsdale NJ, 1978) 3–24.

24. The full title of this informal group was the Committee on Physical Environmental Variables as Determinants of Mental Health. Its members met twice a year for three days from 1954 through to 1966, and included among its long-term members, the psychiatrist Erich Lindemann, the urban economist Harvey Perloff, the sociologist Herbert Gans, the philosopher Scott Buchanan, the biomathematician Nicolas Rashevsky, the ecologist Edward Deevey, the physicist John Q. Stewart, and the chemist and planner Richard Myer. See Leonard Duhl, ed., *The Urban Condition: People and Policy in the Metropolis* (New York, 1963).

25. Calhoun, "Space Bubble" interview (along with Edward Hall and Aristide H. Esser) NBC, May 5, 1969. John B. Calhoun Papers, NLM, Box 20, Cassette V2.

26. Calhoun, "From Mice to Men," *Transaction Studies of the College of Physicians of Philadelphia* 41 (1973): 92–118, 94.

27. Konrad Lorenz, *On Aggression* (San Diego, 1963).

28. Desmond Morris, *The Naked Ape: A Zoologist's Study of the Human Animal* (London, 1967), 39.

29. *Ibid.*, pp. 84–85.

30. Robert Ardrey, *The Social Contract: A Personal Inquiry into the Evolutionary Sources of Order and Disorder* (London, 1970). Ardrey provides a good account of the rodent experiments and the history of overcrowding research. This apparently forms the basis for a subsequent popularization of Calhoun's research—A. H. Drummond, Jr.'s *The Population Puzzle* (Reading MA, 1973)—a work aimed at schoolchildren.

31. Senator Bob Packwood, 92nd Congress, 1st sess. *Congressional Record* (April 1, 1971)

32. Lewis Mumford, *The Urban Prospect* (New York, 1968) 210.

33. By "folk taxonomy" we mean the unofficial but ubiquitous system of classification which categorizes animals as variously "edible," "suitable pet," "beast of burden" etc. All of which, as George Lakoff has noted, sounds very much like the anthropocentric categories Borges lists in "The Celestial Emporium of Benevolent Recognition": "those that belong to the Emperor," "those that are trained," and so on. Lakoff, *Women, Fire, and Dangerous Things: What Categories Reveal About the Mind* (Chicago, 1987), 92; Jorge L. Borges, *Other Inquisitions* (New York, 1966), 108.

34. Newspaper and magazine articles are too numerous to list. Ever since a 1948 *Time* magazine article (“Displaced Rats,” 14 June), Calhoun’s work has sporadically appeared in the mass-circulation press, where it illustrates a variety of themes: in series of articles on modern pollution, Bethami Probst uses Calhoun’s research to discuss stress in the city (widely syndicated, e.g., “It’s Enough To Make You Sick, Part IV: Driven to Distraction!” *The Capital Times* [Madison, WI] 24 April 1970, 20); science writer Frank Carey picks up on Calhoun’s work for a widely syndicated 1973 article (e.g., “Population spoils paradise for mice” *Oshkosh Daily Northwestern*, 14 March 1973 13); and in a 2002 book review (King, John. “City Dumps” rev. of *The City in Mind: Notes on the Urban Condition*, by James Howard Kunstler, *San Francisco Chronicle*, 3 February 2002).

35. R. Sauer, *Voyages: Scenarios for a Ship Called Earth* (New York, 1971).

36. Whilst *Voyages* itself does not make direct reference to Calhoun, it does establish that fiction was explicitly perceived as capable of playing a persuasive role in shaping public opinion.

37. “Blockmania,” *Prog* 236, 31 October 1981, 2000.

38. John Wagner, letter to authors, 20 February 2007; Alan Grant, email to authors, 22 June 2007.

39. Grant/Balent/Smith. “Batman: The Secret of the Universe, Part 2” *Catwoman*. Baldwin, NY: DC Comics. 26 November 1995, 6–7.

40. Crumb had even contributed a story to issue #1 of *Insect Fear*.

41. Calhoun, “Population Density and Social Pathology,” and “What Sort of Box?” *Man-Environment Systems* 3 (1973): 3–30. See also “Looking Forward: feedforward from the Beautiful Ones: a developing book” 18 September 1990. Calhoun Papers, NLM. Box 105. Esp. pages 14–17.

42. Tanner, *City of Words: American Fiction 1950–1970* (New York, 1971), 345.

43. When an interviewer later asks Selby if Tanner’s reading is “an accurate assessment,” Selby would deny that Calhoun had been an intermediary influence, claiming that he was simply trying to “create real people”—and adding that “if in doing that, it ends up these people fall into what this guy categorizes as a ‘behavioral sink,’ then it may be true, but it was never my intent.” Allan Vorda, “Examining the Disease: An interview with Hubert Selby Jr.,” *Literary Review* 35 (1992): 288–302, 290.

44. Calhoun, “Social Pathology”, and “A Behavioral Sink” in E. Bliss, ed., *Roots of Behavior* (New York, 1962).

45. Calhoun, “Social Pathology”, 144.

46. *Ibid.*, p 148.

47. Thompson calls it “the second best in the language” after “atavistic endeavor”—apparently a coinage of his own. Thomson mistakenly believes “behavioral sink” to be Wolfe’s own; so even calibrated against Wolfe’s writing, this one is good. Thompson to Wolfe, 21 April 1968, in Thompson, *Fear and Loathing in America: The Brutal Odyssey of an Outlaw Journalist 1968–1976*, (New York, 2001)

48. Hall was heavily influenced by Calhoun as he developed the field of “proxemics,” the study of social interaction and physical space. See Edward T. Hall, *The Hidden Dimension* (Garden City, NY, 1966).
49. Tom Wolfe, *The Pump House Gang* (New York, 1968), 233.
50. Calhoun, “Looking Backward from ‘The Beautiful Ones,’” in W. R. Klemm, ed., *Discovery Processes in Modern Biology* (Melbourne, FL, 1977).
51. See: sink, n¹ I. 1a. OED, 2nd ed. (1989)
52. See: sink, n¹ I. 2a OED, 2nd ed. (1989)
53. It seems to have been this sense that attracted Calhoun’s attention: he claims to be making an analogy between “social stagnation and behavioral pathology” present in the behavioral sink and the “geomorphic sink with its decaying vegetation and stagnant waters.” Calhoun, “What Sort of Box?” 16.
54. See: sink, n¹ I. 2d. OED, 2nd ed. (1989); and see entry for “Rascals,” in Baret, J. (1573, 1580) *An alvearie or triple (quadruple) dictionarie in Englishe, Latin, and French*. (London: Henry Denham)
55. Jean Gottmann, “Urban geography and the human condition,” in G. A. Harrison and J. B. Gibson, eds., *Man in Urban Environments* (Oxford, 1976) 6.
56. Instead, the journalist here (education correspondent Michael Ryder) seems to assume the term comes from “kitchen sink”—aligning with a theatrical tradition of realist plays set in low-income households. Given the etymology sketched out above, that seems unlikely. Kitchen sink drama is drab and often melancholy, but it isn’t violent or morally corrupt. The “sink estate,” on the other hand, is supposed to point to something altogether more pernicious.
57. John R. Swanton, *Southern Contacts of the Indians North of the Gulf of Mexico* Annaes, XX Congreso Internacional de Americanistas (Rio de Janiero, 1924).
58. Andrée F. Sjöberg, “The Culture of the Tonkawa, a Texas Indian Tribe,” *Texas Journal of Science* 5 (1953): 280–304.
59. Newcomb went on: “[The sink tribes] seem to share no traits that would set them aside from other cultures. Cannibalism hardly suffices to distinguish them . . .”—embedding here a teasing connection with Calhoun’s later use William W. Newcomb, “A Reappraisal of the ‘Cultural Sink’ of Texas,” *Southwestern Journal of Anthropology* 12 (1956): 145–153, 145 and 147.
60. See Alan Booth, *Urban Crowding and its Consequences* (New York, 1976); John Casel, “Health Consequences of Population Density and Crowding,” in Robert Gutman, ed., *People and Buildings* (New York, 1972); Robert Factor and Ingrid Waldron, “Contemporary Population Densities and Human Health,” *Nature* 243 (1973): 381–4; Jonathan Freedman, “The Crowd: Maybe Not so Maddening After All,” *Psychology Today* 5 (1971): 58–61; Robert E. Mitchell, “Some Social Implications of High Density Housing,” *American Sociological Review* 36 (1971), 18–29, and “Misconceptions about Man-Made Space: In Partial Defense of High Density Housing,” *The Family Coordinator* 23 (1974): 51–56; Robert C. Schmitt, “Density, Health, and Social Disorganization,” *Journal of the American Institute of Planners* 32 (1966): 38–40. These studies were then seized upon by critics such

as Mark Baldassare, *Residential Crowding in Urban America* (Berkeley, 1979), Harvey M. Choldin, "Urban Density and Social Pathology," *Annual Review of Sociology* 4 (1978): 91–113, and John E. S. Lawrence, "Science and Sentiment: Overview of Research on Crowding and Human Behavior," *Psychological Bulletin*, 81 (1974): 712–720.

61. Claude S. Fischer, Mark Baldassare, and Richard J. Ofshe, "Crowding Studies and Urban Life: A Critical Review," *Journal of the American Institute of Planners* 41 (1975): 406–18, 415.

62. Baldassare and Fischer, "The Relevance of Crowding Experiments to Urban Studies," in Daniel Stokols, ed., *Perspectives on Environment and Behavior* (New York, 1977), 274.

63. Calhoun, "Plight of the Ik and Kaiadilt is Seen as a Chilling Possible End for Man," *Smithsonian Magazine*, 3 (1972): 27–32, and "Death Squared: the Explosive Growth and Demise of a Mouse Population," *Proceedings of the Royal Society of Medicine* 66 (1973): 80–88.

64. See Richard S. Lazarus and J. B. Cohen, "Environmental Stress", in Irwin Altman and Joachim F. Wohlwill (eds.) *Human Behavior and Environment: Advances in Theory and Research, Volume 2* (New York and London, 1977), Michael P. Smith, *The City and Social Theory* (Oxford, 1980), and Daniel Stokols, "On the Distinction between Density and Crowding: Some Implications for Future Research," *Psychological Review* 79 (1972): 275–77.

65. Morris, *Naked Ape*, p. 177, emphasis added.

66. Fischer and Baldassare, "How Far from the Maddening Crowd?" *New Society* 32 (1975): 531–533, 531.

67. Steven Zlutnick and Irwin Altman, "Crowding and Human Behavior," in J. F. Wohlwill and D. Carson (eds.) *Environment and the Social Sciences: Perspectives and Applications* (Washington DC, 1972) 44–58.

68. J. D. Porteus, *Environment & Behavior: Planning and Everyday Urban Life* (Reading MA, 1977), 176.

69. Fischer and Baldassare, "How Far from the Maddening Crowd?", 531.

70. C. S. Fischer, "Toward a Subcultural Theory of Urbanism," *American Journal of Sociology* 80 (1975): 1319–1341.

71. Freedman, *Crowding and Behavior*, 1.

72. Gunter Gad, "'Crowding' and 'Pathologies': Some Critical Remarks," *Canadian Geographer* 17 (1973): 373–390, 375. Gad's apprehension was shared by some ecologists who commented on the controversial and speculative nature of Calhoun's approach, particularly his "free and frequent transferal of conclusions to the human counterpart." Don Hayne, "Mechanisms of Population Control," *Ecology* 46 (1965): 388–389, 388. See also Dennis Chitty "Crowding Together," *Science* 173 (1971): 42–43, and Bruce Welch, "Experimental Population Ecology," *Science* 146 (1964): 49.

73. See for example, Calhoun, "From Mice to Men."

74. Colin M. Turnbull, *The Mountain People* (New York, 1972).
75. Calhoun, "Plight of the Ik and Kaiadilt." This, however, did not dissuade critics. It gave them further ammunition, one reviewer writing: "The Ik are hardly crowded on their mountain. What appears obvious is that they lost their culture and sense of worthiness, becoming literally demoralized in the process" D. S. Kleinman, *Human Adaptation and Population Growth: A Non-Malthusian Perspective* (Montclair and New York, 1980), 249.
76. Calhoun, "What Sort of Box?," p. 22.
77. Calhoun did use wild Norway rats in his early experiments, taken from Parsons Island in Chesapeake Bay. As they were isolated on the island, he believed them to be genetically similar though generations of inbreeding. In later studies he turned to the Osborne-Mendel strain of rat and the BALB/c mouse.
78. Calhoun, "Looking Backward", p. 30.
79. Calhoun, "Space and the Strategy of Life", p. 370, and H. von Foerster, P. M. Mora and L. W. Amiot, "Doomsday: Friday, 13 November AD 2026," *Science* 132 (1960), 1291–1295.
80. S. Worchel, "Reducing Crowding without Increasing Space: Some Applications of an Attributional Theory of Crowding," *Journal of Population* 1 (1978): 216–230, 217.
81. Calhoun, "The Positive Animal: Increased Human Potentiality enhances Stability of the Total Ecosystem and Preserves Evolution," *Man-Environment Systems*, September (1971).
82. Calhoun, "Meta-Environmentalism," *Man-Environment Systems*, July (1969).
83. Calhoun, "The Positive Animal", p. 4.
84. M. Pines, "How the Social Organization of Animal Communities Can Lead to a Population Crisis Which Destroys Them," in Julius Segal (ed.) *National Institute of Mental Health; Mental Health Reports—5* (Washington DC, 1971) 163.
85. Calhoun, "Space and the Strategy of Life," p. 373.
86. See Calhoun, "What Sort of Box?"
87. Calhoun, "Looking Backward," 30.
88. Calhoun, J. B. C. "Annual Report Summary 1979: Unit for Research on Behavioral Systems," URBS Doc. No. 270, 5 July 1979, Calhoun Papers, NLM, Box 106.
89. Even as his work was being critiqued within the behavioral sciences, it was being enthusiastically taken up by many architects and designers, notably Ian McHarg, *Design with Nature* (New York, 1969), and Barrie Greenbie, *Design for Diversity* (Amsterdam, 1976), who saw in Calhoun's rat cities a stark warning of the dangers of designing against nature, and in his ameliorative experiments, an opportunity to rectify present failures in urban planning. Andrew Euston, a director in the Department of Housing and Urban Design, also described Calhoun as the "guru of the young environmental designers"—in V. W. Wigotsky, "Engineering and the Urban Crisis: Part 3: Urban Congestion," *Design News* September 15 (1970): 48–60. Calhoun's impact upon architects and urban plan-

ners is an issue that we will be exploring in closer detail in future work. However, it's worth noting that even this influence seems to have failed to stand the test of time. In a recent collection of McHarg's lectures, an obvious reference to Calhoun's work is not only treated critically by the editors, but is now misattributed to Hans Selye. Ian McHarg, *Dwelling in Nature: Conversations with Students*, Lynn Margulis, James Corner and Brian Hawthorne, eds., (New York, 2007), 75.

90. Calhoun, "A 'Gedanken Experiment' / A Statement of Intent" unpublished notes, dated 30 September, 1991. Calhoun Papers, NLM, Box 11, p. 1.

91. See H. G. Wells, *World Brain* (London, 1938).

92. Calhoun, J. B., Memorandum, 5 May 1965. Calhoun Papers, NLM, Box 118. Calhoun's solution was to prepare a "reader" of sorts: "it should be possible to reassemble highly selected thought behaviors from many authors to form insight provoking manu- 'scripts'" (Abstract for symposium "Towards a Science of Human Behavior", Calhoun Papers, NLM, Box 11). Focusing on mental health, population, and the environmental and behavioral sciences, Calhoun led by example: he clipped and assembled a vast array of extracts from a total of 162 authors. These he entered into a computer database, numbering them by page and paragraph, isolating keywords, ordering the broad field he had spent his life working within. The finished work would be an anthology called *Environment and Population: Problems of Adaptation* (New York, 1983). The achievement was not simply the content, but the indexical system itself.

93. Calhoun, "The Population Crisis Leading to the Compassionate Revolution and Environmental Design," *World Journal of Psychosynthesis* 4 (1972): 21–28.

94. Calhoun, "What Sort of Box?" p. 8.

95. Calhoun, J. B., Memorandum, 5 May 1965. Calhoun Papers, NLM, Box 118, p. 37.

96. *Ibid.*

97. Calhoun, "Space and the Strategy of Life," p. 331.

98. A further example of Calhoun's tendency to blend the personal, scientific and fictional can be found in the projects that he was working on at the end of his life. He had been writing a science fiction novel as a means of developing and broadcasting his scientific ideas. At the same time, he was also writing an autobiography and a comprehensive book of his scientific research, both of which occupied the same manuscript for Johns Hopkins University Press. A letter from an editor at the Press gently suggested these sections be trimmed: "even at this early stage, we have some thoughts of our own to suggest for your consideration. One is that you not seek to include a personal history of your entire career of research in the substantive chapters" (Anders Richter, letter to Calhoun, 24 April 1984, Calhoun Papers, NLM, Box 18). But of course, for Calhoun, the autobiographical sections are substantive: he has begun to identify with his rats and mice.

99. Calhoun, "A 'Hitchhiker's Guide' to Three Worlds: Fused in 1986 (?)" 13 August 1986. Calhoun Papers, NLM, Box 18, p. 3. Calhoun reports that the remark was made at an awards ceremony on 31 July 1981.

100. *Ibid.* p. 1.

101. Ibid, p. 11.

102. Ibid, p. 13.

103. Jane Gregory, "The Popularization and Excommunication of Fred Hoyle's 'Life From Space' Theory," *Public Understanding of Science* 12 (2003): 25–46.

104. Ibid, p. 39.

105. Wray Herbert, "The (Real) Secret of NIMH," *Science News* 122 (1982): 92–93. Calhoun Papers, NLM, Box 68, Folder 1982.

106. Ibid.

107. S. Rovner, "Rats! The Real Secret of NIMH." *Washington Post* 21 July 1982. B4: 1&4.

108. Calhoun, "Last Cycle of Research," 1974, Calhoun Papers, NLM, Box 45.

109. Ardrey, *The Social Contract*, p. 184.

110. In light of subsequent scholarship on boundaries, it is interesting that Ardrey apparently conceives of disciplinary territory as a fenced border—a secure barrier which prevents escape. Framing the issue in these terms also goes some way towards explaining why people *outside* the "fences" might be happier with Calhoun's disciplinary transgressions than those within.