

2019

## Systems in Play: Simon Nicholson's Design 12 Course, University of California, Berkeley, 1966

Tim Stott

Follow this and additional works at: <https://arrow.tudublin.ie/aaschadpart>



Part of the [Art and Design Commons](#), and the [Education Commons](#)

---

This Article is brought to you for free and open access by the Fine Arts at ARROW@TU Dublin. It has been accepted for inclusion in Articles by an authorized administrator of ARROW@TU Dublin. For more information, please contact [arrow.admin@tudublin.ie](mailto:arrow.admin@tudublin.ie), [aisling.coyne@tudublin.ie](mailto:aisling.coyne@tudublin.ie), [gerard.connolly@tudublin.ie](mailto:gerard.connolly@tudublin.ie).



This work is licensed under a [Creative Commons Attribution-NonCommercial-Share Alike 4.0 License](#)

# Systems in Play: Simon Nicholson's Design 12 Course, University of California, Berkeley, 1966

Timothy Stott

In 1966, British artist, designer and educator Simon Nicholson (1934–1990) offered a lower division course, Design 12, at the College of Environmental Design, UC Berkeley. Controversially, Nicholson promoted play as the principal method of design and invited children to assess students' projects on the Berkeley campus and in local schools, parks, playgrounds and hospitals. This article presents Design 12 as an important example of environmental design pedagogy in the USA, which uniquely attempted to synthesize British post-war constructivism with 'design science' and adventure play. The result was a course that placed play at the centre of design pedagogy, where it could combine intuition with systems building to promote 'involved science' and co-construction.

**Keywords:** Pedagogy—Play—Design education—Constructivism—College of environmental design—Berkeley—Environmental design

## Introduction

In 1966, the College of Environmental Design (CED) at University of California, Berkeley, offered a lower division course written and taught by British artist, designer and educator Simon Nicholson (1934–1990) to provide 'Three-dimensional design experience in the use of machine tools'.<sup>1</sup> The course, titled Design 12, ran for only one year at Berkeley, discontinued after complaints from members of the art faculty. From 1967 to 1971, variants of the course were offered at the UC campuses of Davis, Santa Barbara and Santa Cruz.<sup>2</sup> A short-lived, lower division course such as Design 12 would be unremarkable were it not for the pedagogical role it gave to play in this 'three-dimensional design experience', which was to simulate the three-part process of building: invention, construction and testing. More remarkable still, and perhaps the reason for the faculty's complaints, was that, although invention and construction took place in the tool shop and photo-lab of the CED, children were the primary testers of students' projects on UC campuses and in local schools, parks, playgrounds and hospitals. This inverted the relation of play to the invention of form. Rather than just have students design for play, Nicholson integrated play into design production and evaluation, which enabled students to experience 'designing an object, building a complete edition of it out of actual materials, and testing it in use', and brought them into direct, negotiated contact with users.<sup>3</sup> If, as many designers hoped, children's improvised constructions and anarchic patterns of association in play were to 'point the way to a new architecture and urban design', beyond functionalism and zoning, then children had to be included in the design process.<sup>4</sup> Moreover, Nicholson hoped that this inclusion would then encourage children and the communities to which they belonged to redesign their environments.

Design 12 drew upon the post-war proliferation of educational toys, such as the Eames' *Little Toy* (1951) and *House of Cards* (1952), where the 'user's system validates that of the designer' and players were encouraged to 'think in terms of relationships rather

than aesthetic standards of form'.<sup>5</sup> Amy Ogata has shown how, through promotion of such toys and 'the progressive ideal of teaching through hands-on projects', artists, designers, museums and elementary schools invented the 'creative child' from the 1940s through to the 1970s.<sup>6</sup> Design 12, too, played its part in this invention, but, uniquely, its synthesis of educational toys with adventure play, post-war British constructivism (hereafter 'constructionism': see below) and the design science promoted at CED in the mid-60s included players as assessors and co-constructors of their play environments. Ogata notes that 'the project of the creative child was, and still is, the dream and the work of adults'.<sup>7</sup> Design 12 tried to make it also the work of children.

This transformed the design science of CED into what Alain Findeli calls 'involved science'. In 2001, just as the 'design science' of the Hochschule für Gestaltung Ulm (hereafter HfG) replaced applied aesthetics with 'applied (human and social) science', Findeli argued, design education in the twenty-first century must replace applied with involved science, where

the scientific inquiry and attitude are carried into (instead of applied to) the field of the [design] project and of practice, so that the former are modified by the latter, and vice versa.

Within such a project, Findeli continues, 'the designer's task is to understand the dynamic morphology of the system, its "intelligence"'.<sup>8</sup> Design 12 encouraged students and local children to build and understand systems' intelligence through play. Student projects were not always successful, of course, but their design science was involved, which makes them a precursor to the 'basic design education' that Findeli advocates for the present.

As we now face the 'ludification' of culture and the more widespread 'gamification' of everyday life, we might remind ourselves of an early experiment in design pedagogy oriented, through play, towards system intelligence and co-construction.<sup>9</sup> To adopt current parlance, Design 12 promoted a basic design education in 'ludoliteracy', a play competence 'applicable across the full spectrum of media', for the purposes of diffuse design.<sup>10</sup>

## Design pedagogy at CED in the 1960s

Nicholson arrived at CED in 1965, after a year as Visiting Professor of Sculpture at Moore College of Art, Philadelphia. Upon arrival, he wrote with some excitement to his father, the artist Ben Nicholson: 'It is *not* an art department'. Instead, the 'architectural context' of CED allowed him to uncouple play from artistic expression and subjectivity and integrate it with teaching collaboratively in the social interest.<sup>11</sup> Before I discuss Design 12, I will outline the pedagogical changes underway within this 'architectural context' at the time of Nicholson's arrival.

The CED at Berkeley, established in 1959, was the first in the USA to synthesize Architecture, Landscape Architecture and Urban Planning, or those 'fields which deal with the functional and aesthetic quality of man's surroundings', under the label of environmental design and thereby to encourage architects to collaborate with other designers of the built environment.<sup>12</sup> Through the 1960s and 1970s, CED faculty transformed design methodology and pedagogy to include knowledge of ecology, sustainability and social behaviour and to engage otherwise neglected local client bases. For example, in 1965, Professor of Architecture Sim Van der Ryn extended environmental

analysis of student housing at Berkeley to ‘focus on the silent partner in the design process—the user affected by design decisions’.<sup>13</sup> As CED Professor of Landscape Architecture Claire Cooper Marcus remembers, ‘This was a time of experiment not only in course content but also in teaching and learning methods’.<sup>14</sup>

Through faculty appointments and curriculum development, CED integrated changes brought to design education by the Design Methods movement and HfG. The Design Methods movement sought to make design more ‘scientific’, which was to say rigorous and, above all, systematic, without thereby excluding intuition. It emerged with the seminal Conference on Design Methods held at Imperial College, London, in September 1962. CED Professor of Architecture Joseph Esherick contributed a paper, titled ‘Problems of the Design of a Design System’, to this conference, and two members of the Design Methods movement, Christopher Alexander and Horst Rittel, Rector of HfG from 1960 to 1962, were then hired to the College in 1963, the former as Professor of Architecture and the latter as Professor in the Science of Design.<sup>15</sup>

The term ‘environmental’, inherited from HfG, named a multidisciplinary design methodology based largely upon cybernetics, information theory, systems analysis, social science and semiotics, which provided designers with an integrative approach to design problems and their logics and a turn outward, to think and practice environmentally. CED also inherited HfG’s preference for a curriculum led by science and technology over an art-based curriculum.<sup>16</sup> In October 1957, Tomás Maldonado, chairman of the Rectoral College at HfG, set out a programme for the scientification of design, which in turn required ‘a new dimension in our curriculum, one we can call the methodological dimension’.<sup>17</sup> As a result, HfG abandoned the model of the master’s studio and the hierarchy of designer over collaborators and clients and sought to keep design socially responsible.<sup>18</sup> Between Max Bill’s retirement as Director in 1957 (in response to the ‘technoid degeneration of its once good idea’)<sup>19</sup> and Otl Aicher’s takeover in 1962 (which reinstated the discourse of master and studio), HfG developed a pedagogy of design science, or what Maldonado called ‘scientific operationalism’, which abandoned the primacy given to intuition and artistic sensibility in the Bauhaus and made design a ‘more scientifically-based sociological operation of product management and systems analysis’.<sup>20</sup>

In 1966, CED Dean Martin Meyerson co-wrote a college plan with Professor of Architecture Charles Rusch in which the environmental designer was tasked with acquiring ‘knowledge of functions, of how people live and work and play, and how these activities are changing’, and therefore with ‘programming services for changing life patterns’.<sup>21</sup> At the same time, the Architecture Department introduced a graduate option in Design Theories and Methods, which included

Courses and seminars on the psychology of perception and communication (Charles Rusch), on problem solving procedures and operations research models (Horst Rittel), on programme development and evaluation procedures (Roslyn Lindheim), on methods of architectural research (Sim Van der Ryn), on the integrated specification of environmental structures (Christopher Alexander) and on design methods for specific environmental problems (Joseph Esherick).<sup>22</sup>

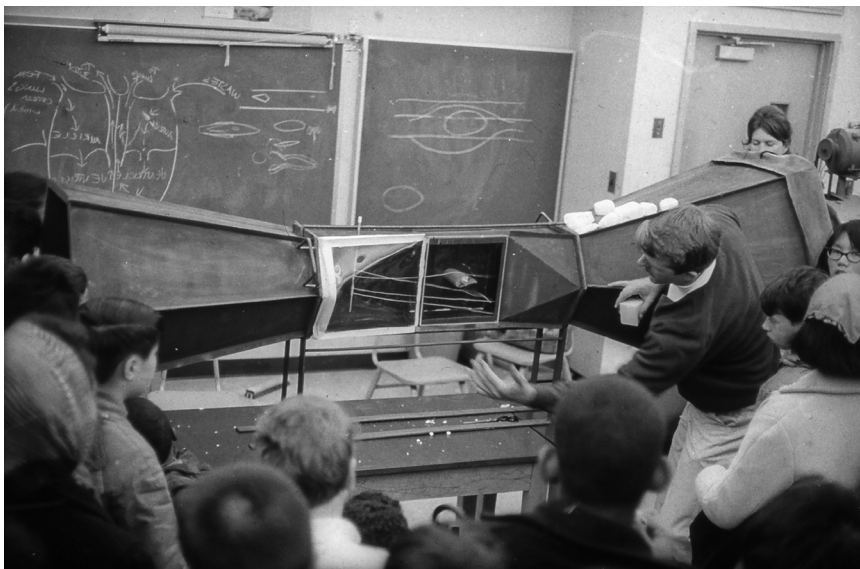
The following year, Gerald McCue, Chair of the Architecture Department, introduced several new faculty appointments. In the words of Dan Solomon, it was ‘a very strange crowd’ who attended the first faculty meeting of 1967, consisting of ‘half architects, half all sorts of other people from operations research, psycho-physics, industrial psych, behaviourism, [and] general systems theory’.<sup>23</sup> Like HfG, these appointments integrated

the natural and social sciences into design education (a tradition already established at Berkeley by Catherine Bauer Wurster, who advocated for architecture to be based on social science research and was responsible for hiring Donald Foley in 1953, the first sociologist in the Department of City and Regional Planning).<sup>24</sup> Several CED architects, such as Christopher Alexander and Ezra Ehrenkrantz (who gained renown for his School Construction Systems Development, initiated in 1961), lauded this ambition to systematize design and to reorient it towards the sciences.

## Design 12

In the autumn of 1966, Design 12 began as an experimental preliminary course in 'Three-dimensional design experience in the use of machine tools'. It had no prerequisites, except Introduction to Design, which allowed architecture and design students to work closely with those of other departments 'concerned with functional analyses, evaluation, and testing', especially from the natural and engineering sciences.<sup>25</sup> Students worked in teams of three or four according to a schedule divided equally into the three parts of invention, construction and testing. The final two stages of each project consisted of a trial where the structure or device was tested on children, followed by a report on its successes and failures, supported by photographic evidence. Two papers were required for assessment, a Systems Exercise and an Evaluation Exercise. For the first, students summarized the functional requirements of a so-called self-instructional structure, 'indicating principal interactions and subsystems'.<sup>26</sup> For the second, they assessed the character and degree of involvement between the structure and its players.

Of the almost fifty projects completed by Design 12 students in the first year, few records remain. [1] shows a sculpture by Nancy Page, Peter Ogilvie and James Shaw at Berkeley in 1967, which is, in fact, a wind tunnel to demonstrate the aerodynamic properties of various objects, the action of valves and the like, to an assembled group of schoolchildren, and to allow those same schoolchildren to test out its variable elements. A diagram on the blackboard behind shows the valves and chambers of the



**Fig 1.** Sculpture by Nancy Page, Peter Ogilvie and James Shaw, Design 12 course, UC Berkeley, 1967. Photograph: Simon Nicholson. With permission from Tuula Nicholson.

heart. Students' structures were, first and foremost, pedagogical, in this case used for elementary physics demonstrations and experiments.

Nicholson's article 'Simulating the Invention, Construction, and Testing of a Building', published in *Studio International* in June 1968, included further photographs, taken by Design 12 students for assessment. These show children playing with student projects on the Berkeley campus, at the Child Study Center, Berkeley [2], and at Croker Highlands School in Oakland.<sup>27</sup> One photograph shows *Project 23*, a swing made of pulley blocks, which children could recompose without the aid of ratchets. The accompanying caption describes this as 'a game that does work—participants have fun increasing mechanical advantage'. *Project 2* allowed players to assemble simple platforms and towers from wooden blocks fitted on to acrylic rods. *Project 6*, titled *Traject-a-Disc* [3], was more elaborate:

An orbit machine that has two controls, an electric shooter attached to a buzzer, that send a ball forward at constant velocity, and a pointer that is geared to the shooter, that alters the angle of fire.

The aim of the game was to shoot a ball across a static platform and into a hole in a rotating disc. The disc could rotate at three speeds and the ball was chalked so that its trajectory could be recorded. Players were given 'predictor sheets' on which to sketch

1. The speed of the rotating disc.
2. The position of the hole when you shoot.
3. The position of the shooter when you shoot.
4. The path you think the ball will travel.
5. The position of the hole when the ball goes in.<sup>28</sup>

Afterwards, players drew in the actual trajectory of the ball and compared it to that predicted.

In one of the few contemporary accounts of the course, published in the same issue of *Studio International*, Jasia Reichardt, Assistant Director of the ICA, London, paraphrased some of the students' evaluations of their projects. The more successful aroused 'intellectual curiosity, discovery and rediscovery of unknown, unpredictable and unexpected relationships' and encouraged 'insight which can be extended to real life'.

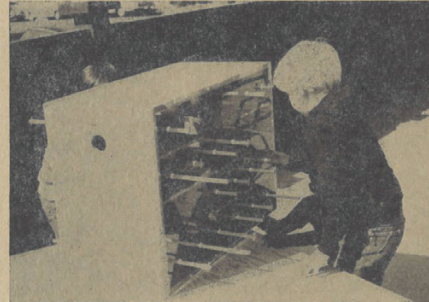
These projects provided a lesson for art, Reichardt believed. To counter the uselessness and mystification of art, which directed 'Many creative endeavours today ... solely towards a tiny section of society [namely] friends and collaborators', she suggested that art should be tested on the public 'in a scientific manner':

Art is an act of transformation which may sometimes appear miraculous, but which does not depend on miracles. When firmly based, it is likely to produce good test results.<sup>29</sup>

For Nicholson, Design 12 abandoned art altogether and engaged two aspects of design: 'first, design methodology, and systematic design: and second, education—specifically the area of self-instruction'.<sup>30</sup> The second of these, self-instruction, was central to the learning promoted through the US Elementary Science curriculum, which sought to 'promote [children's] scientific literacy and general intellectual curiosity', and through a Science Curriculum Improvement Study of 1964, headed by Berkeley Professor of Physics Robert Karplus.<sup>31</sup> The Design 12 handbook included an article from 1966 written by four Berkeley physicists to detail the benefits of 'self-instruction

a limitation forced by safety factors applying to machine tools: students were enrolled from nearly all major departments on campus, including Art, Architecture, Landscape Architecture, Mathematics, Biochemistry,

Physics, Anthropology, Psychology, English, Foreign Languages, and Education. The photos were taken by the students, as photographic documentation was required for all projects as part of the test data. □



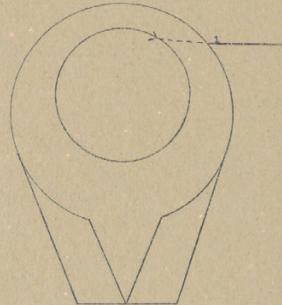
Above *Project 6* called a Traject-a-Disc: an orbit machine that has two controls, an electric shooter attached to a buzzer, that sends a ball forward at constant velocity, and a pointer that is geared to the shooter, that alters the angle of fire: the simplest shot sends the ball over a static Formica platform, then on to the rotating disc, and then down the rotating hole: the motor can be set at three speeds: participants chalk the ball brown so that its trajectory can be recorded on the Formica, and blank predictor sheets are provided: built by L. Rasmussen, V. Field, M. Schurgin, and M. Groch, and tested by children on the University of California campus.

get the ball out): participants invent their own rules of play: they discover getting the ball to level two is impossible in competition, and opposing participants learn to co-operate: your opponents' activities are all visible through the box: built by B. Witte, Y. Lee, P. Buranabunpot, G. Whitfield, and M. Liles, and tested at Berkwood School, Berkeley.

Right *Traject-a-disc predictor sheet*

You draw in:

1. The speed of the rotating disc.
  2. The position of the hole when you shoot.
  3. The position of the shooter when you shoot.
  4. The path you think the ball will travel.
  5. The position of the hole when the ball goes in. This should be dotted.
- After you shoot: Draw in the path the ball really took.



Above right *Project 4*: rectangular masonite flaps are attached to the dowels, and a ping-pong ball may be elevated up three levels and out of one of two holes at the top level (no other way to

## The boy and the painter

A boyhood reminiscence by **Albert Rowe** of the artist **Alfred Wallis** (1855–1942), whose retrospective, jointly with Peter Lanyon (1918–64), is at the Tate Gallery until June 30.

In St. Ives, where I was bred, no matter how bitter the family quarrels were, we all believed in the truth of the saying that 'Blood is thicker than water', and in times of need we acted upon it. So when Alfred Wallis lost his wife and fell upon hard times, Grandfather believed it his duty to help him.

Alfred Wallis and Grandfather had quarrelled bitterly, a long time before—years before I was born in fact—and hadn't exchanged a word since. Neither had any other member of their respective families, for that was the way of it in those days.

Now it was just after his wife's death that I became friends with Alfred and all because I admired one of his paintings. It was the one he'd done just inside his front door and the wooden wall that shut off the parlour from the passage. I remember the incident vividly. I was coming back from a swim—I must have been eight or nine at the time—and as I drew level with Alfred's door, I stopped and looked at the painting.

It was of a schooner sailing on a green and white sea. On the horizon was a lighthouse and in the foreground was part of a familiar looking headland. Obviously it was our own St. Ives bay that Alfred had painted. The lighthouse was Godrevy lighthouse, and the headland was part of Porthminster Point. But what fascinated me was the big fish that swam directly below the schooner.

Although it was supposed to be swimming in the water *beneath* the schooner, it was painted as plainly as if it were laid out flat on the surface for all to see. It was a beauty, with a blunt head and a fine curling tail, and it was huge—bigger than the schooner itself in fact.

I liked the painting very much. Although I thought I could paint better boats and sea than that, the fish was splendid, far better than anything I could do. When Alfred came out and stood in his doorway, I told him how much I liked the painting.

292

**Fig 2.** Page 292, Simon Nicholson, 'Simulating the Invention, Construction, and Testing of a Building', *Studio International*, vol. 175, No. 901 (June 1968). With permission from Studio International. [www.studiointernational.com](http://www.studiointernational.com).

demonstration exhibits' in the Lawrence Hall of Science, the public science museum on the Berkeley campus.<sup>32</sup> These devices allowed students to perform experiments of their own in controlled environments outside the classroom, rather than rely upon lecture demonstrations.

Such was the influence upon Nicholson of these self-instructional exhibits that in 1968 he declared 'nearly all the main developments in art education have been made by scientists'.<sup>33</sup>

The whole future of research into new orders and new structures is unavoidably bound up with the environmental sciences, including biology, architecture and



**Fig 3.** Child Study Center, Berkeley, undated. Photograph: Simon Nicholson. With permission from Tuula Nicholson.

urban design, and because the functional requirements of organisms are determined by available elements and molecules, and the requirements of buildings and cities by materials, fixtures and technology, it is absolutely essential that we understand these factors before we construct. The knowledge of how the building-blocks of both organic and inorganic structures fit together must precede the invention of form.<sup>34</sup>

The 'sculpture' by Page, Ogilvie, and Shaw at Berkeley, which compares with a diagram of the valves of the heart, and then encourages discovery play by schoolchildren, exemplifies such a structure. When transported beyond the classroom into playgrounds and other play environments, as with Projects 2, 6 and 23, play with such structures provided 'knowledge of how the building-blocks of both organic and inorganic structures fit together', Nicholson proposed. In the list of captions for the typescript of his 1968 essay 'The Invention of Form', Nicholson described two exhibits from the Lawrence Hall of Science:

Ball bearings drop through a lattice structure and enable participants to arrive at the laws of probability: right hand control moves the cup to catch the ball.

[...] the participant shoots steel balls (atomic particles) at a pattern of small cones on a rotating disc, representing atomic nuclei in a solid target: a cone is analogous to the electric potential around [...] atomic nuclei.<sup>35</sup>

Traject-a-Disc closely resembles the second of these exhibits. It stops short of illustrating atomic structure, but offers more haptic instruction in alignment, orientation, timing and prediction. Reflecting on Design 12 during a study programme organized by the Park and Recreation Administrators Institute at UC Davis in November 1969, he clarified the educational value of self-instructional structures. These structures, which were often 'miniature environments' within the larger environment of a playground, allowed for invention and encouraged players to predict and anticipate when faced with unexpected behaviour.<sup>36</sup>

The first aspect of the course identified by Nicholson, design methodology and systematic design, derived from his encounter with members of the Design Methods movement. He met British designer Leonard Bruce Archer during the latter's two-week stay at Berkeley in late 1965. Archer, the author of *Systematic Method for Designers*, published in 1964, was visiting lecturer at HfG in 1961, and from 1962, Director of the Research Unit of the School of Industrial Design (Engineering) at the Royal College of Art. At Berkeley, the two discussed design methodologies regarding Archer's redesign of hospital beds for the Ministry of Health in England. Nicholson writes, 'I was interested since the process seems to be basically similar in both pure and applied problems'.<sup>37</sup>

Alexander had the greatest influence upon Nicholson. In 1965, Alexander published 'A City Is Not a Tree' as a two-part essay in the journal *Architecture Forum*,



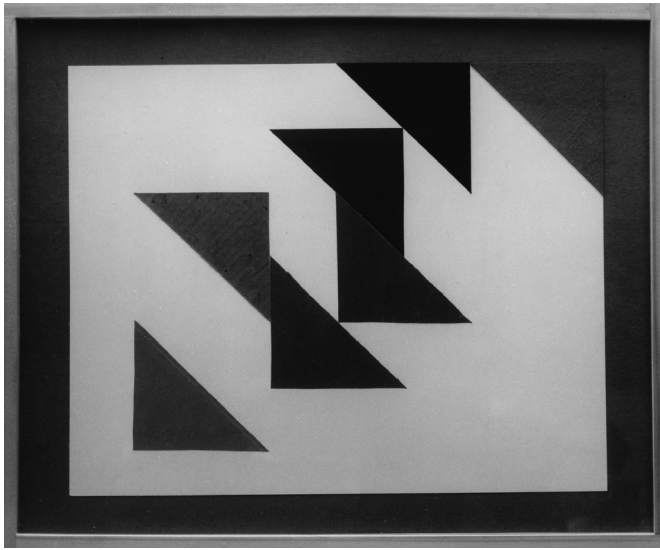
in which he argued for a semi-lattice structure to replace the tree in the design of complex urban systems.<sup>38</sup> The semi-lattice was a 'complex fabric ... the structure of living things', he wrote, found commonly in 'natural' (or long-lived and organic) cities but largely absent from 'artificial' (or modern, planned) cities. The semi-lattice would help the architect to design complexity into the built environment. Yet it was difficult to visualize. Alexander then presented Nicholson's *No. 6112* (1961) [4]. This collage of seven dark equilateral triangles on a pale ground showed the 'overlap' at the heart of the semi-lattice. Each triangle 'enters into four or five completely different kinds of unit, none contained in the others, yet all overlapping in that triangle', and thereby offered a diagram for a complexly interactive architecture.<sup>39</sup>

Alexander's translation of *No. 6112* into an architectural diagram offered support to Nicholson's rapid transition from constructivist sculpture into environmental design. In 'A City Is Not a Tree', Alexander argued that fenced and tarmacked playgrounds disallowed play to 'take place in a thousand places' and to 'fill the interstices of adult life' as it did in natural cities. In 1969, Nicholson diagrammed play environments where the 'experiments, concepts and learning episodes' afforded by self-instructional structures overlap with each other to promote natural play.<sup>40</sup>

In return, Nicholson listed Alexander's *Notes on the Synthesis of Form* (1964) among the readings required for the Systems Exercise and took his understanding of 'system' from a 1967 article by Alexander that defines a system as (1) a whole and (2) a 'kit of parts, with rules about the way these parts may be combined'.<sup>41</sup> For the Systems Exercise, students had to correlate parts to display holistic behaviour and then test whether children could recombine these parts through play. Implicit, too, in this Exercise is Nicholson's later theory of 'loose parts', outlined in his essay 'How Not To Cheat Children: The Theory of Loose Parts', published in 1971 in the journal *Landscape Architecture*. This theory, which is really a theory of open systems for environmental design, states simply that 'In any environment, both the degree of inventiveness and creativity, and the possibility of discovery, are directly proportional to the number and kind of variables in it'.<sup>42</sup>

In this same essay, Nicholson lauded Alexander for his 'pattern-language' developed at the Centre for Environmental Structure at Berkeley, which used 'behavioural data ... as a design determinant'. This, for Nicholson, humanized architecture and urban planning and increased community involvement in both.<sup>43</sup> He rationalized all his courses by reference to 'behavioural data' gathered by watching his and other children play with materials and by giving a principal planning and assessment role to children, understood as natural players who, if asked and listened to, would detail their requirements for play. He compiled questionnaires for children to establish which operational variables they preferred in their play, so that these might be integrated into play environments. These variables, or loose parts, included materials and activities such as wave-making, sliding, gurgling and melting. Because children were best placed to identify those variables, their behaviour and selections had to be integrated as design determinants for student projects. The Evaluation Exercise of Design 12 asked students to consider the 'nature and degree of involvement between participant and structure', by observing and questioning children at play with their systems.<sup>44</sup>

Although rudimentary in its materials and technologies, and Romantic in its view of children's play, Design 12 promoted 'involved science'.<sup>45</sup> Its synthesis through play of



**Fig 4.** Simon Nicholson, *No. 6112* (1961). Collage. Photograph: Simon Nicholson. With permission from Tuula Nicholson.

intuition with systems analysis and social responsibility meets the challenge, noted by René Spitz in his account of design education at HfG, to integrate

the moral dimension of designer's social responsibility into a theory of design that links science, research, intuition, and subjective aesthetic judgement ... how this responsibility can be addressed in an intersubjectively negotiable formulation of design ... has now become a central question in design theory.<sup>46</sup>

Nicholson proposed play as an 'intersubjectively negotiable formulation of design', which expanded the social responsibility of the designer and included otherwise neglected client bases and communities in the design process. This ludic pedagogy aligned with those who promoted adventure playgrounds as one of the 'minor anarchies of everyday life', a bottom-up response to high-density urban environments, opposed

to the top-down provision of sports fields and fixed playground architectures (the notorious three Ss of swings, seesaws and slides) such as Nicholson photographed around Berkeley.<sup>47</sup> Nicholson saw a 'natural evolution' from the participatory design of play structures and environments to community involvement in the 'total process of design and planning'.<sup>48</sup> If children were integrated into the design process from the beginning, 'The process of community involvement, once started, never stops', Nicholson claimed.

[In] the total community the children are the most important. It is not enough to talk about a design methodology; the methodology must be converted into four-dimensional action, or it is worthless.<sup>49</sup>

Nicholson made play this four-dimensional action, which negotiated design intersubjectively. This ludic design pedagogy, expressed through the design science of CED, originated not in the austere studios of HfG or the mathematical formalisms of the Design Method movement, but in artistic developments in post-war British constructivism and its affiliated pedagogy, Basic Design.

### A constructive intelligence

In 1967, upon hearing of his teaching at CED, Dame Barbara Hepworth wrote to Sir Herbert Read that her son seemed to have recognized his roots. 'It may be "square one" but it is a solid rock', she concluded.<sup>50</sup> As a leader of interwar British constructivism, Hepworth most likely meant by 'square one' abstract construction, a preoccupation with the hidden architecture and processes of the natural world, and the desire to unify art and science. Clearly, Nicholson shared these concerns and commitments, but what distinguished the 'square one' of his generation from that of its interwar precursors was its engagement with architecture and the built environment. For example, Anthony Hill criticized those artists (which included Nicholson's parents) associated with *Circle: International Survey of Constructivist Art*, published in 1937, for idealizing and rarefying constructivism during the interwar years and sought to replace their approach

with 'a study of the functional evolution of natural and man-made systems'.<sup>51</sup> This led Hill and other artists, such as John Forrester, to sometimes identify themselves as 'constructionists' and to collaborate with architects and designers on housing projects and other public works (of which more below). In 1955, David Lewis, a close friend of Nicholson, praised Forrester's sculptural work because it began

A natural progression leading directly to an architecture where continuous organisation of structure and space contributes to a dynamic of harmonious interaction between environment and the lives of people.<sup>52</sup>

Hill defined the constructionist's practice as one whose investigation of new materials and techniques led into the realm of architecture.<sup>53</sup> To fulfil the unkept promise of interwar, constructivism was to make art that was environmental. In support of this view, Hill quotes at length from Herbert Read's *Icon and Idea* of 1955:

The future scale of the artist is not domestic, nor even monumental, but environmental: the artist of the future will not be a painter or a sculptor or architect, but a new modeller of plastic forms.<sup>54</sup>

Hill then emphasizes the prosaic quality of this 'pure plastic art'.<sup>55</sup>

For Nicholson, this 'new modeller of plastic forms' could be as prosaic as a playing child. This proposal was implicit to Basic Design pedagogy, which began with the eponymous course established by Victor Pasmore and Richard Hamilton at King's College, Newcastle, in 1953 and was propagated first by a series of summer schools for art and design teachers directed by John Wood of the North Riding of Yorkshire Education Authority at Scarborough from 1955 to 1957.<sup>56</sup> Its pedagogy replaced technique and self-expression with an experimental, process-led approach opposed to what Maurice de Sausmarez called the 'thinly disguised conspiracy against the intelligence' prevalent in British art and design schools at that time.<sup>57</sup> Basic Design deplored the separation of intuition from intellect and of art from science, preferring instead to view these as 'parallel and interdependent'.<sup>58</sup>

De Sausmarez believed that children's play with materials displayed a 'constructive intelligence', most fully expressed in architecture, 'the epitome of intellectual discipline and intuitive logic'.<sup>59</sup> That playing children might be exemplary 'architect-engineer-constructors' (De Sausmarez) had become evident to another Basic Design pedagogue, Harry Thubron, when teaching at Joseph Rowntree Senior School in New Earswick, on the outskirts of York, from Christmas to Easter 1956. Faced with a difficult class, Thubron based exercises on Paul Klee's *Pedagogical Sketchbook*, which allowed students to explore materials without the demands of figuration or expression.<sup>60</sup> 'My principle [sic] aim', he recalled, 'was to give the children an aesthetic and plastic experience that would have distinct value in the matter of living'.<sup>61</sup> As a result, most of the Joseph Rowntree students produced relief or free-standing abstract constructions derived from series or systems, which, for Tom Hudson, who was Thubron's colleague at Leeds College of Art, belonged to the idiom of neo-plasticism.<sup>62</sup> This first attempt to introduce Basic Design to secondary school students prompted Thubron to reimagine art and design education. In early April 1956, he spoke at the conference Adolescent Expression in Art and Craft at Bretton Hall Training College near Wakefield, Yorkshire, where he set out five points for art teaching, including 'removal of any wooliness of thought which sustains the romantic isolation of the artist', a 'more intellectual training incorporating modern technological research' and an expansion of the painter into 'the fields of architecture, aspects of industrial design, exhibition projects, interior

decoration'.<sup>63</sup> Thubron taught the Basic Course at Leeds College of Art between 1955 and 1964. He was also Coordinator of Studies for the Art Foundation-Educational Projects, with Bernard Bertschinger (an artist and collector, and later chairman of the Artists Placement Group) the Director, which advocated Basic Design through the Art Foundation Course.<sup>64</sup>

Analytical more than intuitive, Basic Design was concerned not with the effects and appearance of nature, but with 'knowledge of the causes by which these effects are produced'.<sup>65</sup> As both De Saumarez and Thubron understood, its pedagogy was built upon children's constructive intelligence in play.

## From abstract space to play environments

Nicholson had contact with Basic Design through personal encounters and friendships.<sup>66</sup> Foremost among these friends were Sir Herbert Read, who was a frequent interlocutor during Nicholson's first educational experiments at Berkeley, in the three years prior to Read's death in 1968, and the architect, critic and Secretary of the Penwith Society of the Arts, David Lewis. After studying architecture at the University of Leeds, where he befriended Thubron and Eric Atkinson (Head of Fine Art Department at Leeds College of Art from 1963 to 1969), Lewis informed them of Nicholson's teaching. There is a suggestion that in 1966 they offered Nicholson a position at Leeds, but nothing came of it.<sup>67</sup>

Through his father, Nicholson also knew Pasmore.<sup>68</sup> While in London in 1960, Nicholson wrote approvingly to his father of one of Pasmore's works.<sup>69</sup> In March 1961, he visited the exhibition *Recent Paintings and Constructions by Victor Pasmore* at the New London Gallery, London. Again, Nicholson wrote to his father, 'some of the things in it were very good, but [I] must say quite a few [were] very shoddily put together'.<sup>70</sup> The 'things' to which Nicholson refers were Pasmore's twelve open, articulated reliefs and constructions in painted wood, plastic and Perspex.

With these sculptures, Pasmore explored abstract space, which, Elena Crippa writes, 'unhampered by figurative associations', could be 'experienced more concretely through its factual properties'. Such space belonged neither to painting nor sculpture and 'required a new way of thinking that stretched current notions of art towards design, architecture, and an expanded position for the viewer'.<sup>71</sup> For example, Pasmore used 'transparent membranes' that would 'reflect every nuance of change in [their] surroundings, creating a confusion of real and reflected imagery, and acting as a very sensitive register of ambient conditions'.<sup>72</sup> An exhibition of these membranes, such as *An Exhibit*, co-produced by Pasmore, Richard Hamilton and Lawrence Alloway at the Hatton Gallery in Newcastle in 1957, produced an interactive environment, 'a game, a maze, a ceremony completed by the participation of the visitors'.<sup>73</sup>

Pasmore's use of reflective materials, Crippa writes,

introduced a dynamic and interdependent relationship of work, space and viewer, and notions of play and improvisation became central to the understanding of art-making as a process embracing change and not aiming to produce the 'perfect' final object.<sup>74</sup>

Nicholson's own reliefs from the early 60s show the influence of Pasmore's abstract environments. Of *Structure No. 6509* [5], for example, which consisted of parabolic

mirrors fixed to a board by rubber blocks, Nicholson wrote: 'mobile reflections from a static object: the involvement of a work on a wall can be as great as one in the hand'.<sup>75</sup> What distinguished Nicholson was that his artistic interest extended, from the time of his first solo exhibition at McRoberts and Tunnard Gallery, London in 1963, to 'the visual order of all objects around us and not those partitioned off as art'. The exhibition flyer lists the materials used by Nicholson for his modular and articulated reliefs: 'board, card, coal, cork, feather, felt, foam, glass, leather, metal, paint, plastic, rubber, sand, shell, tape, and corrugated paper'.<sup>76</sup> There is no mention here of Nicholson's interest in play, but at the same time, he produced games for his children, many of which, such as *Structure No. 6748*, were presented in glass-fronted frames as relief sculptures with movable parts such as ball bearings or dowels. In January 1964, Nicholson asked his father about a ball-in-labyrinth game he had given the latter.<sup>77</sup> In California, Nicholson investigated the ludic properties of abstract space with several 'wands', glass or Perspex cylinders filled with various loose materials and exemplified by his *Magic Blower*, a 'vertical wind tunnel' or long Perspex cylinder linked to a switch-operated fan in which various materials could be placed and blown along, which featured in the *Play Orbit* exhibition at the ICA, London, in the winter of 1969/1970.<sup>78</sup> Several of these 'wands' were exhibited at the Carl Van der Voort Gallery in San Francisco in January 1968 and the Gallery for Contemporary Art, Oakland, in March 1969. In 1969, after failing to patent his *Magic Blower* by way of Marcus Brumwell of the Design Research Unit, London, Simon noted that his father encountered similar problems when he produced a modified ping pong table, with a 'board [a convex ramp] to replace the net'. This table provided a 'good illustration of the connection between abstract games and abstract art'.<sup>79</sup> In fact, Nicholson believed game design to be the future of abstract sculpture, as most people experienced abstract forms and structures most vividly not through conventional artistic media but through games and toys.<sup>80</sup>

Yet, it was through design pedagogy more than sculpture that Nicholson expanded Pasmore's dynamic, abstract space. Two comparisons show how, with Design 12, Nicholson superseded his constructionist precursors' designs of play environments. John Forrester, for example, scaled up his interactive sculptures to function as adaptable architecture. He worked with the architects Jack Lynn and Ivor Smith on the Park Hill housing scheme in Sheffield between 1954 and 1959. Gathercole writes of his difficulty in finding details about Forrester's involvement in this Brutalist scheme, but it is telling nonetheless that his major contribution was to the play areas and play equipment 'that translate his open-frame (art) constructions toward different (functional) ends'.<sup>81</sup> The Park Hill playground's rudimentary architecture of tunnels, corridors and alcoves closely resemble the open-frame structures built by children under supervision by Nicholson and Design 12 students at the Child Study Center, Berkeley [2]. The



**Fig 5.** Simon Nicholson, *Structure No. 6509*, undated. Parabolic mirrors mounted on wooden blocks. Photograph: Simon Nicholson. With permission from Tuula Nicholson.

latter, with which children built walls, roofs, tunnels and the like, were provisional and re-combinable, quite distinct from the former's concrete fixity. The Park Hill playground (reconstructed in 2015 by the collective Assemble for the RIBA Gallery, London) has lost sight of that architecture that would contribute to 'a dynamic of harmonious interaction between environment and the lives of people', anticipated by Lewis in his review of Forrester's sculptures.

A second comparison involves Pasmore, whose 'successive-dimensional model towards logical conclusions' led him, Thistlewood argues, to consider 'connections between constructive art and environmental design'.<sup>82</sup> From 1955 to 1977, he worked as Consulting Director of Urban Design at Peterlee New Town, County Durham, England. Pasmore's most striking and controversial contribution to Peterlee was his *Apollo Pavilion*, built in 1969 to plans first laid out in the 1950s. Pasmore conceived of the *Pavilion* as,

an architecture and sculpture of purely abstract form through which to walk, in which to linger and on which to play, a free and anonymous monument which, because of its independence, can lift the activity and psychology of an urban housing community on to a universal plane.<sup>83</sup>

The *Pavilion* was to provide a centre for leisure and community activities. However, local inhabitants rejected it. By the 1970s, the *Pavilion* was plagued by vandalism and anti-social behaviour. Because of this, the steps at either end were removed, to leave what one local councillor called 'a dirty old bit of concrete'.<sup>84</sup>

The *Pavilion* typifies the failure of top-down urban planning, even as it combined constructive art and environmental design through what Pasmore conceived, in part, as a play structure.

Nicholson encouraged similar combinations through Design 12 but differed from Pasmore and Forrester. Less concerned with how to provide for the imagined leisure needs of a community or to lift them 'on to a universal plane', Nicholson sought to educate students and children to take on the role of Read's 'new modeller of plastic forms'. For Nicholson, as it became environmental, abstract space was not so much to be played with as to be constructed through play. Whereas Forrester sought to translate his constructions into functional play frames, Nicholson begins from play—the play of those other than the artist or designer—as the activity that makes environmental design possible. This was especially evident with Nicholson's UC courses after Design 12, where he and his students would work with at least thirteen local elementary schools to redesign their play facilities.<sup>85</sup>

## Conclusion

In March 1971, Nicholson wrote to his father of his 'activities ... linking visual art with ... education, architecture, city planning, community involvement, open-space, play, playgrounds, parks, recreation, free-time and a number of other things'.<sup>86</sup> Design 12 initiated these activities. Its legacy extends widely. Nicholson's TAD292 Art and Environment course, run by the Faculty of Mathematics, Computing and Technology of the Open University from 1976 to 1985, was directed at adult learners and professionals, but its pedagogy centred upon the child's play with interactive objects and environments.<sup>87</sup> At Berkeley, Robin Moore, Assistant Professor of Urban Design, who had assisted Nicholson on the latter's X396 Invention and Creativity: Constructing New

Environments for Children in Spring 1970, two years later collaborated with principal Herbert Wong, to transform the tarmac playground of Washington Elementary School, Berkeley. The so-called Environmental Yard sought to recapture the local ecology and to initiate a change in values and attitudes towards play provision and elementary education.<sup>88</sup> In 1974, Moore moved to North Carolina State University, where he established the Natural Learning Initiative. Marcus, too, shared Nicholson's interest in adventure play and its 'lost landscapes of spontaneity'.<sup>89</sup> She made children's play a measure for the success of community housing.<sup>90</sup>

More broadly, through the 1960s and 1970s, celebrated for its voluntary, collaborative and improvisatory character, play trained a generation of children and adults in the behavioural and cognitive repertoires required for an open society defined by interactive technologies, flexible labour, ecological awareness and networked sociability. As the discourse of creativity and learning now threatens to reduce play to, at best, a mode of individual expression, and at worst, training in entrepreneurship and resilience for the neoliberal economy, it is important to remember the radicalism of constructivist precursors, such as Design 12, which synthesized involved science with collaborative design, proposed play as an 'intersubjectively negotiable formulation of design' and, most importantly, encouraged players, especially children, to understand the intelligence of systems.

Timothy Stott

Senior Lecturer in Art History and Visual Culture, NA 105, Dublin School of Creative Arts

Technological University Dublin, Grangegorman, Dublin D07 H97W, Ireland

E-mail: [tim.stott@dit.ie](mailto:tim.stott@dit.ie)

Timothy Stott is a historian of contemporary art and design, with a focus on pedagogy, participation and ecology. The research for this article was supported by a Visiting Research Fellowship at the Henry Moore Institute, Leeds, in 2016.

*Acknowledgements: I am deeply grateful to David Lewis, and especially Silvie and Tuula Nicholson, for their time and generosity, and to the Henry Moore Institute, the National Arts Education Archive and the Environmental Design Archives at Berkeley for their support.*

## Notes

- 1 'Section Two: Courses and Curricula', *University of California, Berkeley, General Catalogue 1966–1967*, vol. 60 (Berkeley: University of California, 1966), 203.
- 2 Simon Nicholson, letter to Sir Herbert Read, 26 October 1967 (Leeds University Special Collections, BC MS 20c Herbert Read, box 6b).
- 3 Design 12 syllabus, College of Environmental Design, University of California, Berkeley, Spring Quarter 1967, 1.
- 4 Juliet Kinchin, 'Reclaiming the City: Children and the New Urbanism', in *Century of the Child: Growing by Design, 1900–2000*, eds Juliet Kinchin and Aidan O'Connor (New York: Museum of Modern Art, 2012), 162.
- 5 Lawrence Alloway, 'Eames' World', *Architectural Association Journal* 72 (1956): 54–55.
- 6 See Amy F. Ogata, *Designing the Creative Child: Playthings and Places in Midcentury America* (Minneapolis: University of Minnesota Press, 2013), 147.
- 7 *Ibid.*, p. 187.
- 8 Alain Findeli, 'Rethinking Design Education for the 21st Century: Theoretical, Methodological, and Ethical Discussion', *Design Issues* 17 (2001): 10.
- 9 On gamification, see Sonia Fuchs, Mathias Fizek, Paolo Ruffino and Niklas Schrape (eds), *Rethinking Gamification* (Lüneburg: Meson Press, 2014).
- 10 Joost Raessens, *Homo Ludens 2.0: The Ludic Turn in Media Theory* (Utrecht: Utrecht University Press, 2012), 22. See José Zagal, *Ludoliteracy: Defining, Understanding, and Supporting Games Education* (Pittsburgh: ETC Press, 2010). On 'diffuse design', see Ezio Manzini, *Design, When Everybody Designs: An Introduction to Design for Social Innovation* translated by Rachel Coad (Cambridge, MA: MIT Press, 2015).

- 11 Simon Nicholson, letter to Ben Nicholson, 19 August 1965, TGA 8717/1/1/1592.
- 12 Introduction, *University of California, Berkeley, General Catalogue 1966–1967*, 69.
- 13 Sim Van der Ryn and Murray Silverstein, *Dorms at Berkeley: An Environmental Analysis* (Berkeley: Center for Planning and Development Research, 1967), 7.
- 14 Claire Cooper Marcus, 'Social Factors in Architecture, 1960–2004', in *Design on the Edge: A Century of Teaching Architecture at the University of California, Berkeley, 1903–2003*, eds Waverley Lowell, Elizabeth Byrne and Bets Frederick-Rothwell (Berkeley: College of Environmental Design, 2009), 142.
- 15 Joseph Esherick, 'Problems of the Design of a Design System', in *Conference on Design Methods*, eds John Christopher Jones and Denis G. Thornley (London: Pergamon Press, 1963), 75–82.
- 16 See Heiner Jacob, 'HfG Ulm: A Personal View of an Experiment in Democracy and Design Education', *Journal of Design Education* 1 (1988): 221–234.
- 17 Tomás Maldonado, *Bericht in der Verwaltungsratssitzung am 21 April 1958* [Report to the Management Board meeting 21 April 1958], unpublished manuscript, Ulm, 1958, quoted in René Spitz, "'Design is not a Science": Otl Aicher's Constitutional Putsch at the HfG Ulm and His Credo for the Social Responsibility of Designers', *Design Issues* 31 (2015): 10.
- 18 Otl Aicher, 'HfG Ulm: A Concise History', *Archithese* 15 (1975), republished as Appendix 3 to Jacob, 'HfG Ulm: A Personal View of an Experiment in Democracy and Design Education', 232.
- 19 Max Bill, 'der Modelfall Ulm', *Form* 6 (1958): 32–33.
- 20 Paul Betts, 'Science, Semiotics and Society: The Ulm Hochschule für Gestaltung in Retrospect', *Design Issues* 14 (1998): 76.
- 21 Martin Meyerson and Charles Rusch, 'Discussion Draft of the College Plan', in *Design on the Edge*, 85.
- 22 Jean-Pierre Protzen, 'Design Theories and Methods at Berkeley', in *Design on the Edge*, 164.
- 23 Dan Solomon, 'Reminiscences for the Wurster Redux and Architecture Department Centennial Event, November 2003', in *Design on the Edge*, 87.
- 24 Robert and Peter Montgomery, 'Architecture on the (Cutting) Edge', 110.
- 25 Design 12 syllabus, unpaginated.
- 26 Ibid.
- 27 Simon Nicholson, 'Simulating the Invention, Construction, and Testing of a Building', *Studio International* 175 (1968): 291–292.
- 28 Ibid., p. 292.
- 29 Jasia Reichardt, 'Art and Usefulness', *Studio International* 175 (1968): 290–291.
- 30 Nicholson, letter to the Head of the Environmental Design Library, Arthur Waugh, 6 June 1967, included in *Anthology of Materials for an Experimental Course in the Teaching of Design* (Berkeley, CA, 1967).
- 31 Design 12 syllabus, 4. See Robert Karplus, 'The Science Curriculum Improvement Study', *Journal of Research in Science Teaching* 2 (1964): 293–303.
- 32 Mauri Gould, Robert Rice, Hans Weltin and Harvey White, 'Quantitative Demonstration Exhibits and a New Low-Cost Physics Laboratory', *American Journal of Physics* 34 (1966): 660.
- 33 Simon Nicholson, 'The Invention of Form', *Architects Yearbook* XII (1968): 281; typescript for 'The Invention of Form', 1968, included with letter to Sir Herbert Read, 18 April 1968 (Leeds University Special Collections, BC MS 20c Herbert Read, box 6b).
- 34 Nicholson, 'The Invention of Form', 282.
- 35 Nicholson, typescript for 'The Invention of Form', 1968.
- 36 Simon Nicholson, 'What Do Playgrounds Teach?' *Planning and Design of the Recreation Environment*, proceedings from the 1969 Park & Recreation Administrators Institute (Davis, CA: University of California, 1970), 5–3.
- 37 Simon Nicholson, letter to Sir Herbert Read, 25 November 1965 (Leeds University Special Collections, BC MS 20c Herbert Read, box 6b).
- 38 Christopher Alexander, 'A City Is Not a Tree', *Ekistics* 23 (1967): 344. Republished from *Architectural Forum* 122 (1965).
- 39 Alexander, 'A City Is Not a Tree', 348.
- 40 See Nicholson, 'What Do Playgrounds Teach?', 5–7.
- 41 Christopher Alexander, 'Systems Generating Systems', *Systemat*, Inland Steel Products Company, 1967, unpaginated.
- 42 Simon Nicholson, 'How Not to Cheat Children: The Theory of Loose Parts', *Landscape Architecture* 62 (1971): 30.
- 43 Ibid., p. 31.
- 44 Design 12 syllabus, unpaginated.
- 45 On Nicholson's Romanticism, see Mark Francis and Ray Lorenzo, 'Seven Realms of Children's Participation', *Journal of Environmental Psychology* 22 (2002): 160.
- 46 Spitz, 'Design Is Not a Science', 16.
- 47 Colin Ward, 'Adventure Playground: A Parable of Anarchy', *Anarchy* 7 (1961): 193. Ward later became Programme Consultant for TAD292 *Art and Environment*, Nicholson's



- Open University course. The seminal text here is Lady Allen of Hurtwood (Marjory Allen), 'Why Not Use Our Bombsites Like This?' *Picture Post*, 16 November 1946, 28.
- 48 Nicholson, 'How Not to Cheat Children', 31.
- 49 *Ibid.*, p. 33.
- 50 Dame Barbara Hepworth, letter to Sir Herbert Read, 10 December 1967 (Leeds University Special Collections, BC MS 20c Herbert Read, box 6b).
- 51 Sam Gathercole, 'Art and Construction in Britain in the 1950s', *Art History* 29 (2006): 907.
- 52 David Lewis, 'Art, 1930–1955: A Quick Review', *Architectural Design* 25 (1955): 369.
- 53 Anthony Hill, 'The Constructionist Idea and Architecture', *ARK* 1 (1956): 24.
- 54 Herbert Read, *Icon and Idea: The Function of Art in the Development of Human Consciousness* (Harvard: Harvard University Press, 1955), 133.
- 55 Hill, 'The Constructionist Idea and Architecture', 29.
- 56 See David Thistlewood, *A Continuing Process: The New Creativity in British Art Education 1955–65* (London: ICA, 1981); Richard Yeomans, *The Foundation Course of Victor Pasmore and Richard Hamilton 1954–1966*, unpublished PhD thesis (Institute of Education, University of London, 1987); and Elena Crippa and Beth Williamson (eds) *Basic Design*, exhibition catalogue for Basic Design, Tate Britain, 25 March to 25 September 2013 (London: Tate Design Studio, 2013).
- 57 Maurice de Sausmarez, 'The Next Phase', talk given at the SEA conference 'Adolescent Expression in Art and Craft' at Bretton Hall, Yorkshire, 3–7 April 1956, National Arts Education Archive (NAEA), BR/PL/904, 20.
- 58 *Ibid.*, p. 21.
- 59 *Ibid.*
- 60 Frank Lyle, interview with Harry Thubron, 19 September 1974, NAEA, uncatalogued transcript, 3.
- 61 Harry Thubron, 'An Experiment in Basic Art Education', transcript for talk given at 'Adolescent Expression in Art and Craft', NAEA BR/PL/904, 19.
- 62 Tom Hudson quoted in Forrest, 'Leeds College of Art 1955–1960'.
- 63 Thubron, 'An Experiment in Basic Art Education', 18.
- 64 A brochure for Art Foundation-Educational Projects 1963–1964 is available at NAEA HT/PL/91/3.
- 65 Introduction to eleven-day course in Drawing, Painting, Sculpture and Construction, North Riding Summer School, Scarborough 1956, letter from Victor Pasmore to Richard Yeomans in R. Yeomans, *The Foundation Course of Victor Pasmore and Richard Hamilton, 1954–1966*, unpublished thesis (University of London, 1987), NAEA RH/BK/1.
- 66 In 1960, while working as a typographer, Nicholson was commissioned by Bertschinger to design the notepaper for the Art Foundation-Educational Projects. He found Bertschinger to be 'a most amusing and interesting man', but there is nothing to suggest that they discussed art education. Letter to Ben Nicholson, 8 February 1960, TGA 8717/1/1/1538.
- 67 David Lewis, conversation with the author, 26 October 2016. In 1966, Nicholson wrote to his father, 'We cannot afford another move—psychologically or financially. I think Leeds would be a real come down after California' (letter, 8 June 1966, TGA 8717/1/1/1595).
- 68 On the relationship of Pasmore to Ben Nicholson, see Alistair Grieve, 'Light Flirtation or Serious Affair? Ben Nicholson, Victor Pasmore and Abstract Art in St Ives and London in the Early 1950s', *The Burlington Magazine* 151 (2009): 234–242.
- 69 Simon Nicholson, letter to Ben Nicholson, 25 February 1960, TGA 8717/1/1/1539.
- 70 Simon Nicholson, letter to Ben Nicholson, 17 April 1961, TGA 8717/1/1/1548.
- 71 Elena Crippa, 'Designing Exhibitions, Exhibiting Participation', in *Exhibition, Design, Participation: 'An Exhibit' 1957 and Related Projects*, ed. Crippa et al. (London: Afterall, 2016), 15.
- 72 Thistlewood, 'Disciplined Irrationality', 38.
- 73 Lawrence Alloway, *An Exhibit*, exhibition catalogue (Newcastle and London: Hatton Gallery and ICA, 1957), unpaginated.
- 74 Crippa, 'Designing Exhibitions, Exhibiting Participation', 24.
- 75 Simon Nicholson, list of captions, typescript for 'The Invention of Form', 1968.
- 76 Simon Nicholson, statement on flyer for exhibition at McRoberts and Tunnard Gallery, London, 1963, TGA 20132/4/5/9/1.
- 77 Nicholson describes the labyrinth game in a letter to Ben Nicholson, 16 January 1964, TGA 8717/1/1/1579.
- 78 Nicholson, 'What Do Playgrounds Teach?', 5–7. See Timothy Stott, 'When Attitudes Became Toys: Jasja Reichardt's *Play Orbit*', *Art History* 41 (2018): 344–369.
- 79 Simon Nicholson, letter to Ben Nicholson, 20 February 1970, TGA 8717/1/1/1612. Ben Nicholson was a keen practical joker and fiercely competitive player of ping pong (Ronnie Duncan, conversation with the author, Otley, Yorkshire, 24 October 2016), who sometimes used his bald pate as a second bat (David Lewis, phone conversation with the author, 26 October 2016).

- 80 Letter from Simon Nicholson to Herbert Read, 18 April 1968 (Leeds University Special Collections, BC MS 20c Herbert Read, box 6b).
- 81 Gathercole, 'Art and Construction in Britain in the 1950s', 891.
- 82 Thistlewood, *A Continuing Process*, 20.
- 83 Victor Pasmore, cited in Colin Ward, *New Town, Home Town: The Lessons of Experience* (London: Calouste Gulbenkian Foundation, 1993), 16.
- 84 Joan Maslin, quoted in Jonathan Glancey, 'If They Had an A-Bomb', *The Guardian*, 12 November 2001.
- 85 See Timothy Stott, 'Ludic Pedagogies at the College of Environmental Design, UC Berkeley, 1966 to 1972', in *The Culture of Nature in the History of Design*, ed. Kjetil Fallan (London: Routledge, 2019).
- 86 Simon Nicholson, letter to Ben Nicholson, 20 February 1970, TGA 8717/1/1/1616.
- 87 See Simon Nicholson, *Interactive Art and Play*, Unit 10 of the TAD 292 course (Milton Keynes: Open University Press, 1976).
- 88 Robin Moore, 'Anarchy Zone: Kids' Needs and School Yards', *The School Review* 82 (1974): 622.
- 89 See Claire Cooper Marcus, 'Adventure Playground: Europe Leads US in Reuniting Its Children with "The Lost Landscape of Spontaneity"', *Landscape Architecture Quarterly* 61 (1970): 18–29, 88–91, and 'Adventure Playgrounds: Creative Play in Urban Settings', *Planning and Design of the Recreation Environment*, proceedings from the 1969 Park & Recreation Administrators Institute (Davis, CA: University of California, 1970).
- 90 Claire Cooper Marcus, 'Children's Play Behaviour in a Low-Rise Inner-City Housing Development', in *Man-Environment Interactions: Evaluations and Applications*, ed. Daniel H. Carson (Stroudsburg: Dowden, Hutchinson & Ross, 1974), 197–211.