

An Analysis of the Condon Report on the Colorado UFO Project

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Abstract—The "Condon Report," presenting the findings of the Colorado Project on a scientific study of unidentified flying objects, has been and remains the most influential public document concerning the scientific status of this problem. Hence, all current scientific work on the UFO problem must make reference to the Condon Report. For this reason, it remains important to understand the contents of this report, the work on which the report is based, and the relationship of the "Summary of the Study" and "Conclusions and Recommendations" to the body of the report. The present analysis of this report contains an overview, an analysis of evidence by categories, and a discussion of scientific methodology. The overview shows that most case studies were conducted by junior staff; the senior staff took little part, and the director took no part, in these investigations. The analysis of evidence by categories shows that there are substantial and significant differences between the findings of the project staff and those that the director attributes to the project. Although both the director and the staff are cautious in stating conclusions, the staff tend to emphasize challenging cases and unanswered questions, whereas the director emphasizes the difficulty of further study and the probability that there is no scientific knowledge to be gained.

Concerning methodology, it appears that the project was unable to identify current challenging cases that warranted truly exhaustive investigation. Nor did the project develop a uniform and systematic procedure for cataloging the large number of older cases with which they were provided. In drawing conclusions from the study of such a problem, the nature and scope of which are fraught with so much uncertainty, it would have been prudent to avoid theory-dependent arguments.

Introduction

The "UFO phenomenon," which is here taken to comprise those events that lead to reports of "unidentified flying objects," is of widespread public interest but elicits comparatively little interest from most scientists, who—

An early version of this article was read by a number of people, some of whom were kind enough to send me their comments on that version. I acknowledge with gratitude comments received from T. Bloecher, S. J. Colby, H. R. Crane, D. M. Dennison, E. R. Hilgard, R. J. Low, H. M. Johnson, H. Mark, D. R. Saunders, F. E. Roach and O. G. Villard. A draft of the final version was read most carefully by Associate Editor David Jacobs and by an anonymous referee, both of whom made valuable suggestions that resulted in notable improvements in the article. However, there may well remain errors of fact or of perception, and I hope that readers will draw my attention to such further errors as they may detect.

judge from their public statements—perceive the study of this phenomenon not only as unproductive but also as not respectable. An editorial in *Science* (Abelson, 1974) refers to unidentified flying objects in a discussion of "pseudoscience," which is termed an "intellectual poison." On the other hand, a survey of members of the American Astronomical Society, which permitted members to express opinions under the cloak of anonymity, indicates that scientists are probably more interested in and more open-minded towards this subject than one would judge from their public statements (Sturrock, 1977).

The history of the UFO phenomenon in the United States is long and complex. Jacobs (1975) has given a comprehensive account of this history up to 1973 in his book *UFO Controversy in America*. This book presents a detailed account of the origin of the Colorado UFO Project, of which the following is a very brief encapsulation.

The United States Air Force carried out three consecutive studies of the UFO phenomenon over a 22-year period: Project Sign, from 1947 to 1948; Project Grudge from 1948 to 1952; and Project Blue Book from 1952 to 1969. Although these studies and their reports were initially classified, it appears that all reports (except Blue Book Special Report No. 13, if it ever existed) have now been declassified and are publicly available. The Air Force organized an "Ad Hoc Committee to Review Project Blue Book," and this committee met in February 1966. Its members were Brian O'Brien (chairman), Lauror Carter, Jesse Orlansky, Richard Porter, Carl Sagan, and Willis A. Ware. This committee recommended that the Air Force negotiate contracts "with a few selected universities to provide selected teams to investigate promptly and in depth certain selected sightings of UFOs." This recommendation led eventually (in October 1966) to an Air Force contract to the University of Colorado. The director was Professor Edward U. Condon, a very distinguished physicist and a man of strong and independent character.

Work on this contract was carried out over a two-year period with a substantial scientific staff. Since this study is the only unclassified investigation¹ of the UFO phenomenon carried out by an established scientific organization under contract to a U.S. federal agency, the report of this study (Condon & Gillmor 1968; usually referred to as the "Condon Report") constitutes a landmark in the study of the UFO phenomenon, to which all later work must be referred. For instance, any review of the UFO phenomenon to be published in one of the mainstream scientific journals must begin with a discussion of the Condon Report (CR) explaining where and why the author disagrees with the findings of that report. Even more important, any proposal to the Air Force or any other federal agency, requesting funds for UFO research, must begin by explaining why the Condon Report is not to be accepted as the last word on the problem.

¹ But see the "Postscript" section of this present analysis.

There has, in fact, been considerable development in UFO research since the Colorado Project: at that time, APRO (Aerial Phenomena Research Organization) and NICAP (National Investigations Committee for Aerial Phenomena) were in existence. Since that time, MUFON (Mutual UFO Network) has emerged as an even larger organization for UFO research; CUFOS (Center for UFO Studies) has been founded by J. Allen Hynek; and CNES (Centre Nationale d'Études Spatiale, the French equivalent of NASA) has set up a small group (GEPAN: Group d'Étude des Phénomènes Aérospatiaux Non-Identifiés) with the charge of studying UFO reports, most of which are channeled to GEPAN by the gendarmerie according to a well defined and well functioning procedure.

Two studies that were initially classified but have since been declassified deserve special mention. One of these was conducted by a panel comprising Luis Alvarez, Lloyd Berkner, Samuel A. Goudsmit, Thornton Page, and H. P. Robertson (chairman), with Frederic C. Durant and J. Allen Hynek serving as associate members. This panel was convened by the Central Intelligence Agency for a period of five days in 1953 to consider the question whether UFOs constitute a threat to national defense. The panel concluded that there was "no evidence that the phenomena indicate a need for the revision of current scientific concepts" and that "the evidence . . . shows no indication that these phenomena constitute a direct physical threat to national security" (Jacobs, 1975).

The other study was conducted by the Battelle Memorial Institute, under contract to the Air Force, from 1951 to 1953. It was primarily a statistical analysis of the conditions and characteristics of UFO reports, but it also included transcripts of several notable sightings. The report of this study (Blue Book Special Report No. 14), which was initially classified but subsequently released, contains a wealth of information and arrives at the notable conclusion that the more complete the data and the better the report, the more likely it was that the report would *remain* unidentified (Jacobs, 1975).

The Condon Report is not a *committee* report: it is not a document signed by a number of scientists, each making his own appraisal but coming—as a group—to a common position and recommendation. It is a *project* report, containing contributions from the scientific staff and an overview by the project director. This fact is crucial and helps one to understand the contents of the report.

Section² CR I and CR II, the "Conclusions and Recommendations" and the "Summary of the Study," are written by Condon himself. Condon's summary is followed by six summaries of different aspects of the research, written by staff members, together with a summary of opinion polls conducted by the American Institute of Public Opinion, more familiarly known as the Gallup

² Sections of the Condon Report are referred to as "Section CR I," etc., to distinguish them from sections of the present article. Page references to the Condon Report are denoted by the prefix "CR."

Poll. The staff summaries are followed by 240 pages of case studies. The entire report, with supplementary and peripheral material, is almost 1,000 pages in length.

The general impression given by Condon's summary is that there is nothing unusual or significant in the UFO phenomenon. This view gains significant additional weight from the fact that the Condon Report was reviewed by a panel of eminent scientists of the National Academy of Sciences who endorsed both the methodology and findings of the report (Condon & Gillmor, 1968, pp. vii-ix). We shall consider the NAS Panel Report only briefly in Section V.

The attitudes of scientists towards the UFO problem will be discussed in Section II. An overview of the Condon Report then follows in Section III. In Section IV, we compare Condon's "Summary of the Study" with the six staff summaries, and then proceed to compare each staff summary with the case summaries on which it was based. Section V is devoted to a discussion of scientific methodology, and Section VI is given to a discussion of the present analysis. At the time of revising this article in accordance with the referee's report, I have taken the opportunity to add a short postscript based on material released by the Central Intelligence Agency after this analysis was first prepared.

Some readers may be interested in reading other reviews of the Condon Report. Soon after the Report was published, *Icarus* carried two reviews, one by McDonald (1969) and the other by Chiu (1969). Hynek (1972) and Jacobs (1975), in their books on the UFO problem, each devote a chapter to the Condon Report.

Scientists and the UFO Phenomenon

Although, as indicated in Section I, the scientific community has tended to minimize the significance of the UFO phenomenon, certain individual scientists have argued that the phenomenon is both real and significant. Such views have been presented in the Hearings of the House Committee on Science and Astronautics (Roush, 1968) and in the book by Hynek (1972). It is also notable that one major national scientific society, the American Institute of Aeronautics and Astronautics, set up a subcommittee in 1967 to "gain a fresh and objective perspective on the UFO phenomenon." This subcommittee published a position statement (Kuettner, 1970) and sponsored the publication of analyses of two UFO cases (McDonald, 1971; Thayer, 1971), each of which was considered also by the Condon team. The AIAA versions of these cases are more detailed than those found in the Condon Report and are clearly based on more extensive data.

In their public statements (but not necessarily in their private statements; see Sturrock, 1978), scientists express a generally negative attitude towards the UFO problem, and it is interesting to try to understand this attitude. Most scientists have never had the occasion to confront evidence concerning the UFO phenomenon. To a scientist, the main source of hard information (other than his own experiments or observations) is provided by the scientific journals.

With rare exceptions, scientific journals do not publish reports of UFO observations. The decision not to publish is made by the editor acting on the advice of reviewers. This process is self-reinforcing: the apparent lack of data confirms the view that there is nothing to the UFO phenomenon, and this view works against the presentation of relevant data. If a bizarre phenomenon is reported—sometimes in colorful and emotional terms—in the popular press, and if sober accounts of the same phenomenon are never documented in scientific journals, scientists may understandably come to believe that the reports are spurious: at best, misperceptions of familiar objects and phenomena, and at worst deliberate hoaxes perpetrated on an uncritical public.

Any scientist who spends a small amount of time investigating the subject will soon realize that many of the simpler and more credible reports can, indeed, be interpreted as mirages, weather balloons, and other familiar natural phenomena and technological devices. Further study may turn up dramatic reports that, if they are to be believed, indicate that the earth is being visited by members of a very advanced civilization, which is therefore presumed to be alien and extraterrestrial, traveling in craft that behave in a fantastic manner. When faced with such a possibility, the scientist tends to look at the implications of such a hypothesis. In making his deductions, he has available a great store of information concerning the solar system, the universe, laws of physics, and conditions in which living organisms can survive. Using this information, the scientist may well conclude that the hypothesis must be rejected.

An example of this type of argument is advanced by Condon himself (Condon & Gillmor, 1968, p. 28). Starting from the assertion that an alien civilization must originate on a planet of the sun or some other star, Condon argues that a civilization based on a planet attached to a nearby star would not set out on a journey to earth until the civilization knows that an advanced technology has been established here. From this consideration he estimates that there is no possibility of such a civilization visiting earth in the next 10,000 years. Concerning the solar system, Condon takes the view that only Venus and Mars might provide possible abodes for life and argues that our knowledge of these planets provides no evidence for the existence of advanced civilizations on these planets.

It appears, therefore, that the difference in attitude toward the UFO phenomenon on the part of scientists and members of the public may to some extent be understood in terms of the stricter demands of evidence and proof required by the former, and in part by the large amount of information available to the former that tends to argue for interpretation in familiar terms and against explanation in terms of alien civilizations. However, there may well be other factors influencing scientists' attitudes, such as the fear of ridicule.

Further comments may be advanced concerning the attitudes of particular groups of scientists. For instance, physicists appear to attach importance to single conclusive cases: the evolution of physics is marked by such milestones as Thomson's demonstration of the particle nature of cathode rays, Davisson and Germer's demonstration of the wave nature of the electron, etc. This

attitude is, in fact, capsulated by Condon's hypothetical case that would convince all scientists that UFOs are spacecraft from an alien civilization (Condon & Gillmor, 1968, p. 26):

The question of ETA (Extra-Terrestrial Actuality) would be settled in a few minutes if a flying saucer were to land on the lawn of the hotel where a convention of the American Physical Society was in progress and its occupants were to emerge and present a special paper to the assembled physicists, revealing where they came from and the technology of how their craft operates. Searching questions from the audience would follow.

By contrast, information concerning astronomical phenomena is typically accumulated more laboriously. Furthermore, the picture emerging from astronomical data may for many years remain inconclusive and perhaps contradictory. When one also notes that astronomical observations represent a passive activity, essentially different from the design and operation of experiments, one might conclude that study of the UFO phenomenon bears more similarity to astronomical research than to laboratory studies in the physical sciences.

The above contrast between the attitudes of physicists and astronomers has been overdrawn in order to emphasize a point. Quantum mechanics emerged from many years of patient and unspectacular studies of atomic spectra, and a very short run of radio observations were sufficient to establish the existence of a new class of astronomical objects now called "radio pulsars" (Hewish, Bell, Pilkington, Scott, & Collins, 1968).

Overview

The Condon Report, presenting the results of the Colorado Project on a Scientific Study of Unidentified Flying Objects, does not give the impression of a tightly integrated research program. The total budget over a two-year period was \$500,000, but the report lists 37 members of the staff project and a number of other individuals were consulted in addition. It is clear that the Air Force was receiving a very high return of scientific manpower for its money, even though most of the staff must have been contributing only a small fraction of their time to the project. One would have expected that such a large research effort would have been organized into teams led by the other principal investigators or by members of the full-time staff, but there is no indication that such a structure was set up.

Professor Condon is listed as the "Director" of the project. The following are listed as "Principal Investigators": Stuart W. Cook, Professor of Psychology; Franklin E. Roach, Professor of Astrogeophysics; and David R. Saunders, Professor of Psychology; in addition, William A. Scott, Professor of Psychology, is listed as "Co-Principal Investigator"; all were at the University of Colorado. Mr. Robert J. Low, with degrees in Electrical Engineering and Business Administration, was the "Project Coordinator." In addition, there were five "Research Associates": Norman E. Levine (PhD, Engineering), Ronald I. Presnell

(MS, Engineering), Gerald M. Rothberg (PhD, Physics), Herbert J. Strentz (MA, Journalism), and James E. Wadsworth (BA, Behavioral Science).

The hard core of the report is Section CR IV, which presents 59 cases. In this work, the Director took no part; one Principal Investigator worked on two cases, another Principal Investigator on one case; the Co-Principal Investigator took no part; the Project Coordinator worked on eight cases; one Research Associate (Dr. Levine) worked on eight cases; Dr. Rothberg on one case; and Mr. Wadsworth on 17 cases. Important contributions to case studies were made by Roy Craig (PhD, Physical Chemistry) and William K. Hartmann (PhD, Astronomy), who are listed simply as "staff members." Craig and Hartmann each worked on 14 cases.

The next most important section is Section CR III, which presents six summaries of the work of the Colorado Project, together with a review of opinion polls by Aldora Lee (PhD, Social Psychology). None was written by the Director, one by a Principal Investigator (Roach), none by the Research Associates. Three chapters were written by Craig, one by Hartmann, and one by Gordon Thayer (BS, Physics).

Section CR V, dealing with historical aspects of UFO phenomena, comprises three chapters, and Section CR VI, dealing with "The Scientific Context," comprises 10 chapters. Of these 13 chapters, one was written by the Director. The remaining 12 chapters were written by staff members not previously listed in this discussion.

Concerning Sections CR III to V, it is seen that a substantial contribution was made by one Principal Investigator (Roach) and by the Project Coordinator. The remainder of the staff made no contribution to the Report or only specialized contributions. Section CR I, "Conclusions and Recommendations," and Section CR II, "Summary of the Study," were written by the Director. This breakdown is summarized in Table 1.

Another important part of any scientific study is the definition of the scope of the study and definitions of the principal terms involved. Condon states (Condon & Gillmor, 1968, p. 1) that "The emphasis of the study has been on attempting to learn from UFO reports anything that could be considered as adding to scientific knowledge." His conclusion (Condon & Gillmor, 1968, p. 1) was that "nothing has come from the study of UFOs in the last twenty years that has added to scientific knowledge. . . . Further extensive study of UFOs probably cannot be justified in the expectation that science will be advanced thereby."

The key definition is given by Condon as follows:

An unidentified flying object (UFO, pronounced OO-FO³) is here defined as the stimulus for a report made by one or more individuals of something seen in the sky (or an object thought to be capable of flight but seen when landed on the earth) which the observer could not identify as having an ordinary natural original, which seemed to him sufficiently puzzling that he undertook to make a report of it to the police, to

³ The pronunciation originated with Condon and appears to have been used only by him.

TABLE 1
Breakdown of activities among staff

		Condon report			
		Sec. IV 59 cases	Sec. III 7 summaries	Sec. V, VI 13 chapters	Sec. I, II
Condon	Director	0	0	1	2
Cook	Principal Investigator	1	0	0	0
Roach	Principal Investigator	2	1	0	0
Scott	Co-Principal Investigator	0	0	0	0
Low	Project Coordinator	8	0	0	0
Levine	Research Associate	8	0	0	0
Presnell	Research Associate	0	0	0	0
Rothberg	Research Associate	1	0	0	0
Strentz	Research Associate	0	0	0	0
Wadsworth	Research Associate	17	0	0	0
Craig	"Staff"	13	3	0	0
Hartmann	"Staff"	14	1	0	0
Lee	"Staff"	0	1	0	0
Thayer	"Staff"	0	1	0	0
Others		≥30	0	12	0

government officials, to the press, or perhaps to a representative of a private organization devoted to the study of such objects. Defined in this way, there is no question as to the existence of UFOs because UFO reports exist in very large numbers, and the stimulus for each report is, by this definition, an UFO. The problem then becomes that of learning to recognize the various kinds of stimuli that give rise to UFO reports.

Most scientists who study UFOs adopt a more restricted definition that rules out reports that are readily explainable (see, for instance, Hynek, 1972, pp. 3, 4). Furthermore, some members of the project staff must have adopted a different definition of "UFO" since one finds on Condon and Gillmor (1968) p. 248 the statement "The preponderance of evidence indicates the possibility of a genuine UFO in this case" and on Condon and Gillmor (1968) p. 256, "The probability of at least one UFO involved appears to be fairly high."

In most scientific research, investigators have in mind one or more considered hypotheses. Condon specifically mentions the following:

The idea that some UFOs may be spacecraft sent to Earth from another civilization, residing on another planet of the solar system, or on a planet associated with a more distant star than the Sun, is called the Extra-terrestrial Hypothesis (ETH).

It is somewhat confusing that Condon also introduces the term "Extra-terrestrial Actuality" (ETA), which apparently represents the belief that ETH is true. Condon's finding (Condon & Gillmor, 1968, p. 25) is that "No direct evidence whatever of a convincing nature now exists for the claim that any UFOs represent spacecraft visiting Earth from another civilization." In reach-

ing this conclusion, Condon takes the position (Condon & Gillmor, 1968, p. 19) that "If an UFO report can be plausibly explained in ordinary terms, then we accept that explanation, even though not enough evidence may be available to prove it beyond all doubt."

In assessing the basis for Condon's conclusion, we may refer to the staff summaries that comprise Section CR III; the staff summaries are based, in turn, on the case studies. In the next section, we shall consider the evidence as categorized in the staff summaries, referring to specific cases as seems appropriate. In the remainder of this section, we shall categorize cases according to the conclusions drawn by the project staff.

In addition to three observations by astronauts (which will be discussed separately in Section IV), 59 cases are listed in Section CR IV. One of these (Case 14) involves six separate events. Another (Case 38) is a discussion of "over 800 sightings of UFOs." The appraisals were as follows:

1. No event; one case (19).
2. Inconsistent data, possible hoaxes, or otherwise of no probative value; 17 cases (4, 7, 14.4, 22, 23, 24, 26, 32, 33, 39, 42, 44, 48, 52, 53, 56, 58).
3. Identified (anything from "conclusively" to "inconclusively"); 25 cases (3, 9, 11, 14.3, 14.6, 15, 18, 20, 25, 27, 28, 29, 35, 36, 37, 40, 41, 43, 45, 49, 50, 5i, 54, 55).
4. Not identified; 14 cases (1, 5, 6, 8, 10, 12, 13, 14.2, 17, 21, 32, 34, 47, 59).
5. Delusions; 2 cases (16, 38).
6. Not appraised due to evasion by Air Force; 1 case (30).⁴
7. Possible UFOs; 2 cases (14.1, 57).
8. Probable UFOs; 2 cases (2, 46).

Evaluation of Evidence by Category

We now consider evidence by category, drawing from both Section CR III (staff summaries) and Section CR IV (case studies) of the report.

Narrative Evidence

Craig states (Condon & Gillmor, 1968, pp. 72, 73):

While the current cases investigated did not yield impressive residual evidence, even in the narrative content, to support an hypothesis that an alien vehicle was physically present, narratives of past events, such as the 1966 incident at Beverly, Mass. (Case 6), would fit no other explanation if the testimony of witnesses is taken at face value.

⁴This case is discussed further in the "Postscript."

Case 6 is described on Condon and Gillmor (1968) pp. 266–270. The abstract of this case (Condon & Gillmor, 1968) p. 266 is as follows:

Three adult women went onto the high school athletic field to check the identity of a bright light which had frightened an 11-year-old girl in her home nearby, and reported that one of three lights they saw maneuvering in the sky above the school flew noiselessly toward them, coming directly overhead, 20–30 ft. above one of them. It was described as a flowing [sic], solid disc-like, automobile-sized object. Two policemen who responded to a telephone message that a UFO was under observation verified that an extraordinary object was flying over the high school. The object has not been identified. Most of the extended observation, however, apparently was an observation of the planet Jupiter.

Photographic Evidence

In his summary of this category, Hartmann (Condon & Gillmor, 1968, p. 86) describes a "residual group of unidentified" which "is not inconsistent with the hypothesis that unknown and extraordinary aircraft have penetrated the airspace of the United States," although "none yields sufficient evidence to establish this hypothesis." A little later, Hartmann remarks:

After investigation, there remains a small residual of the order of 2 of all cases, that appears to represent well recorded but unidentified or unidentifiable objects that are airborne—i.e., UFOs. . . . The present data are compatible with, but do not establish either the hypothesis that (1) the entire UFO phenomenon is a product of misidentification, poor reporting, and fabrication, or that (2) a very small part of the UFO phenomenon involves extraordinary events.

As examples of the "small residual" cases, we may refer to Cases 46 and 47. Concerning Case 46 (McMinnville, Oregon, May 11, 1950), Hartmann reaches the following conclusions (Condon & Gillmor, 1968, p. 407):

This is one of the few UFO reports in which all factors investigated, geometric, psychological, and physical appear to be consistent with the assertion that an extraordinary flying object, silvery, metallic, disc-shaped, tens of meters in diameter, and evidently artificial, flew within the sight of two witnesses. It cannot be said that the evidence positively rules out fabrication, although there are some factors such as the accuracy of certain photometric measures of the original negatives which argue against a fabrication.

Hartmann describes Case 47 (Great Falls, Montana, August 15, 1950) in an abstract as follows:

Witness I, General Manager of a Great Falls baseball team, and Witness II, Secretary, observed two white lights moving slowly across the sky. Witness I made 16 mm motion pictures of the lights. Both individuals have recently reaffirmed the observation, and there is little reason to question its validity. The case remains unexplained. Analysis indicates that the images on the film are difficult to reconcile with aircraft or other known phenomena, although aircraft cannot be entirely ruled out.

It is interesting to compare Hartmann's report and case studies with Condon's two-page summary of "Study of UFO Photographs" (Condon & Gillmor, 1968, pp. 35-37). Only one paragraph is clearly based on Hartmann's work. This reads:

Hartmann made a detailed study of 35 photographic cases (Section IV, Chapter 3) referring to the period 1966-1968, and a selection of eighteen older cases, some of which have been widely acclaimed in the UFO literature. This photographic study led to the identification of a number of widely publicized photographs as being ordinary objects, others as fabrications, and others as innocent misidentifications of things photographed under unusual conditions.

In fact, Hartmann discusses 14 cases, of which six are from the period 1966-1968. Concerning the McMinnville, Oregon, case (Case 46), Condon refers not to the analysis made by Hartmann, but to an analysis made by Everitt Merritt, who was not a member of the project staff, but a photogrammetrist on the staff of the Autometrics Division of the Raytheon Company of Alexandria, Virginia. Merritt found that "the UFO images turned out to be too fuzzy to allow worthwhile further parametric analysis." Condon reports at length Merritt's analysis of another case (Zanesville, Ohio; not discussed anywhere else in the report) that was considered to be a hoax, and also discusses two photographs published in *Look* magazine, quoting the analysis of Staff Sergeant Earl Schroeder of the Wright-Patterson Air Force Base. Schroeder is not listed as being affiliated with the Colorado UFO Project, and the case he analyzed was not considered by the project staff.

Apart from generalizations, Condon devotes only one and one-half pages to discussion of photographic evidence. Of this one and one-half pages, 60% is devoted to the work of Merritt, 30% to the work of Schroeder, and only 10% to the work of Hartmann. Further, as we have seen, Condon's summary of the work of his own staffmember (Hartmann) was quite inadequate and—for whatever reasons—misleading.

Radar-Visual Cases

Special importance may be attached to cases in which both visual and radar observations were made, and in which these observations were consistent. Such cases will typically involve several witnesses: they involve observations made at two or more "channels" of the electromagnetic spectrum; and the radar observations provide distance measurements and possibly height measurements also. Such cases are discussed in two staff summaries: Section CR III, Chapter 2, "Field Studies" by Craig (Condon & Gillmor, 1968, pp. 51-75), and Section CR III, Chapter 5, "Optical and Radar Analysis of Field Cases" by Thayer (Condon & Gillmor, 1968, pp. 115-176).

Thayer, in his summary of radar-visual cases, states (Condon & Gillmor, 1968, p. 175): "There is a small, but significant, residue of cases from the radar-visual files (i.e., 1482N, Case 2) that have no plausible explanation such

as propagation phenomena and/or misinterpreted man-made objects." Earlier in his summary (Condon & Gillmor, 1968, pp. 163–164), Thayer makes the following comment on this case, which he then identifies as "Lakenheath, England, August 13–14, 1956, 2230–0330 LST": "The probability that anomalous propagation of radar signals may have been involved in this case seems to be small." Later, he adds: "The apparently rational, intelligent behavior of the UFO suggests a mechanical device of unknown origin as the most probable explanation of this sighting."

Case 2 (listed, rather oddly, as "Greenwich, summer 1956") is presented in the Condon Report (Condon & Gillmor, 1968) pp. 248–256. The abstract reads as follows:

At least one UFO was tracked by air traffic control radar (GCA) at two USAF-RAF stations, with apparently corresponding visual sightings of round, white rapidly moving objects which changed directions abruptly. Interception by KAF fighter aircraft was attempted; one aircraft was vectored to the UFO by GCA radar and the pilot reported airborne radar contact and radar "gunlock." The UFO appeared to circle around behind the aircraft and followed it in spite of the pilot's evasive maneuvers. Contact was broken when the aircraft returned to base, low on fuel. The preponderance of evidence indicates the possibility of a genuine UFO in this case. The weather was generally clear with good visibility.

This case has been further described by Thayer (1971) as one of the AIAA cases. It is interesting to note the conclusion given by Thayer, at the end of this article, which reflects his view after further intensive study of this case:

In conclusion, with two highly redundant contacts—the first with ground radar, combined with both ground and airborne visual observers, and the second with airborne radar, an airborne visual observer, and two different ground radars—the Bentwaters-Lakenheath UFO incident represents one of the most significant radar-visual UFO cases. Taking into consideration the high credibility of the information and the cohesiveness and continuity of accounts, combined with a high degree of 'strangeness', it is also certainly one of the most disturbing UFO incidents known today.

The other case of special interest is Case 5 (Condon & Gillmor, 1968, pp. 260–266) listed in the Condon Report as "South-Central, Fall, 1957." This case is reviewed by Craig (Condon & Gillmor, 1968, pp. 56–58). He emphasizes that "No report of the incident was found in Blue Book files or in the files of NORAD Headquarters at Ent AFB." [The reason that no report was found is that the project staff had incorrectly dated the event as September 19, 1957, whereas it actually occurred on July 17, 1957.] Craig, in describing the phenomenon, stated:

It disappeared suddenly and reappeared at a different location both visually and on airborne and ground radars. Since visual and radar observation seemed to coincide, reflection of ground radar did not seem a satisfactory explanation. Other explanations such as airplanes, meteors, and plasma also seem unsatisfactory.

Craig concludes (Condon & Gillmor, 1968, p. 57): "If the report is accurate, it describes an unusual, intriguing, and puzzling phenomenon, which, in the absence of additional information, must be listed as unidentified.

The case is also discussed extensively by Thayer in his summary (Condon & Gillmor, 1968, pp. 136-139). Thayer attempts an explanation in terms of "anomalous propagation" (AP) echoes and an unidentified ground light source, but adds, "There are many unexplained aspects to this sighting, however, and a solution such as given above, although possible, does not seem highly probable." The reader is urged to assess this statement by reviewing the case (Condon & Gillmor, 1968, pp. 260-266) and by reading the more extensive AIAA-sponsored account of McDonald (1971), who determined the correct date of this event and so obtained Air Force records that the Condon staff had been unable to track down. The AIAA case is, therefore, more complete, more detailed, and more reliable than the study presented in the Condon Report. The summary of this case, as given by McDonald, is as follows:

An Air Force RB-47, equipped with electronic countermeasures (ECM) gear, and manned by six officers, was followed by an unidentified object for a distance of well over 700 mi. and for a time period of 1.5 hr., as it flew from Mississippi, through Louisiana and Texas and into Oklahoma. The object was, at various times, seen visually by the cockpit crew as an intensely luminous light, followed by ground-radar and detected on ECM monitoring gear aboard the RB-47. Of special interest in this case are several instances of simultaneous appearances and disappearances on all three of those physically distinct 'channels,' and rapidity of maneuvers beyond the prior experience of the air crew.

Condon, in his "Summary of the Study," devotes almost three pages to discussion of radar sightings of UFOs, but his comments on the case studies of the Colorado Project are confined to two short paragraphs comprising only 10% of Condon's discussion of radar sightings. As an evaluation of these case studies, he quotes from Thayer's summary: ". . . there was no case where the meteorological data available tended to negate the anomalous propagation hypothesis. . . ." This is, at best, an unfortunate quotation, implying that Thayer regards the anomalous propagation hypothesis as offering a plausible explanation of every case. A more complete quotation of Thayer's remark (Condon & Gillmor, 1968, p. 172) is as follows:

The reader should note that the assignment of cases into the probable AP cause category could have been made on the basis of the observational testimony alone. That is to say, that there was no case where the meteorological data available tended to negate the anomalous propagation hypothesis, thereby causing that case to be assigned to some other category.

In the table (Condon & Gillmor, 1968, p. 173) to which Thayer is referring, we see that for only 19 of the 35 cases does Thayer regard anomalous prop-

agation to be the "most likely or most plausible explanation." Thayer's assessment is perhaps presented more clearly by a later quotation (Condon & Gillmor, 1968, p. 174): ". . . where the observational data pointed to anomalous propagation as the probable cause of an UFO incident, the meteorological data are overwhelmingly in favour of the plausibility of the AP hypothesis." Thayer has clearly concluded that a substantial fraction of radar observations are probably due to anomalous propagation effects; but it is equally clear that he does not ascribe *all* radar observations to this phenomenon. The impression given by Condon's summary concerning radar-visual cases is, therefore, at variance with Thayer's summary and with the cases on which Thayer's summary is based.

Condon's account of radar cases is very similar to his account of photographic evidence: very little of what he writes makes reference to the work of his staff, and what he does write about his staff's work is misleading.

Radar Detection Without Visual Detection

Both Craig and Thayer attach special significance to Case 21 (Condon & Gillmor, 1968, pp. 310–316) [Colorado Springs, Colorado, May 13, 1967] in which clear and consistent signals were shown by *two* airport radars, with no corresponding visual observation. The abstract of this case [identified on Condon & Gillmor (1968 p. 310) only as "South Mountain (Location A), Spring, 1967"] is as follows:

Operators of two airport radars reported that a target equivalent to an aircraft had followed a commercial flight in, overtaken it, and passed it on one side, and proceeding [*sic*] at about 200 knots until it left the radar field. No corresponding object was visible from the control tower. On the basis of witnesses' reports and weather records, explanations based on anomalous atmospheric propagation or freak reflection from other objects appear inadequate. The case is not adequately explained despite features that suggest a reflection effect (see Section CR III, Chapter 6).

[Section CR III, Chapter 6, is devoted to "Visual Observations Made by U.S. Astronauts" and contains nothing relevant to this case.]

Craig, in his summary of "Field Studies," makes the following comment on this case (Condon & Gillmor, 1968, p. 72): "Of the current cases involving radar observations, one remained particularly puzzling after analysis of the information, since anomalous propagation and other common explanations apparently could not account for the observation. . . ."

In his summary of "Optical and Radar Analysis of Field Cases," Thayer devoted over one page (Condon & Gillmor, 1968, pp. 170–171) to this case. He remarks: "This is a radar-only case, and is of particular interest because the UFO could not be seen, when there was every indication that it should have been seen." He points out that, although no object was seen from the ground, from the landing Braniff plane, or from a following Continental Airlines plane, the UFO followed "precisely the correct procedure for an over-

taking aircraft, or one which is practicing an ILS approach but does not actually intend to touch down." In Thayer's opinion, "A ghost echo seems to be ruled out." He concludes that

This must remain one of the most puzzling radar cases on record, and no conclusion is possible at this time. It seems inconceivable that an anomalous propagation echo would behave in the manner described, particularly with respect to the reported altitude changes, even if AP had been likely at the time. In view of the meteorological situation, it would seem that AP was rather unlikely. Besides, what is the probability that an AP return would appear only once, and at that time appear to execute a perfect practice ILS approach?

Condon makes no reference to this case in the section of his summary dealing with radar sightings of UFOs.

Miscellaneous Evidence

Brief mention only will be made of some of the other types of evidence considered in the report. Section CR III, Chapter 6, concerns "Visual Observations Made by U.S. Astronauts" as studied by Professor Franklin E. Roach (Condon & Gillmor, 1968, pp. 176-208). The final paragraph of Roach's "Summary and Evaluation" is as follows:

The three unexplained sightings which have been gleaned from a great mass of reports are a challenge to the analyst. Especially puzzling is the first one of the list, the daytime sighting of an object showing details such as arms (antennas?) protruding from a body having a noticeable angular extension. If the NORAD listing of objects near the GT-4 spacecraft at the time of the sighting is complete as it presumably is, we shall have to find a rational explanation, or alternatively, keep it on our list of unidentifieds.

Condon, in discussing these observations (Condon & Gillmor, 1968, pp. 42-43), quotes Roach's remark that the three sightings are "a challenge to the analyst," and goes on to remark that "nothing definite relating to the ETH aspects of UFOs has been established as a result of these rather sporadic observations."

Concerning "Direct Physical Evidence," Craig (Condon & Gillmor, 1968, pp. 94-97) attaches special significance to "metal fragments that purportedly fell to earth at Ubatuba, São Paulo, Brazil, from an exploding extra-terrestrial vehicle. The metal was alleged to be of such extreme purity that it could not have been produced by earthly technology." Investigation by the Colorado staff showed that a sample of triply sublimed magnesium, supplied by the Dow Chemical Company, had a smaller impurity level than that of the "Brazil UFO." The analysis, however, showed that the fragments contained traces of both barium and strontium, which are not usual impurities in the production of magnesium; these metals were undetectable in the Dow sample. Craig remarks, "The high content of Sr was particularly interesting since Sr is not an expected impurity in magnesium made by usual production methods, and

Dr. Busk [of Dow Chemical Company] knew of no one who intentionally added strontium to commercial magnesium." It was found that Dow Metallurgical Laboratory had made experimental batches of magnesium alloy containing 0.1% up to 40% of strontium, which is to be compared with the level of 500 ± 100 parts per million of strontium in the Brazil sample. Although the lowest value in this range is twice the value found in the Brazil sample, Craig states that Dow had "produced a . . . batch of magnesium containing nominally the same concentration of Sr as was continued [sic] in the Ubatuba sample."

Craig also makes the following remarks: "Metallographic examinations show large, elongated magnesium grains, indicating that the metal had not been worked after solidification from the liquid or vapor state. It, therefore, seems doubtful that this sample had been a part of a fabricated metal object." This is a very curious remark, implying—as it does—that no fabricated object has ever been made of cast metal.

Condon, in his summary, remarks that "the magnesium metal was found to be much less pure than the regular commercial metal produced in 1957 by the Dow Chemical Company . . . (and) therefore it need not have come from an extra-terrestrial source. . . ."

Once again, Condon's statement does not give an accurate representation of the work of his staff. The staff describe the comparison sample simply as "magnesium produced by known earthly technology" (Condon & Gillmor, 1968, p. 96). Condon describes it as "regular commercial magnesium." As Craig states (Condon & Gillmor, 1968, p. 95), the Dow Chemical Company has "supplied on request samples of triply sublimed magnesium." These samples represented a laboratory production, not "regular commercial magnesium." Furthermore, the samples of triply sublimed magnesium supplied by the Dow Chemical Company had not been annealed (annealing would introduce further impurities), so that their metallurgical properties were grossly different from those of Brazil magnesium.

However, the most regrettable aspect of the Colorado Project investigation of the Brazil magnesium is that the investigation was confined to a rather limited laboratory analysis of the sample. It is a basic rule of UFO research that one must assess the *total* evidence, which always includes the narrative evidence. According to this rule, another investigator (fluent in Portuguese, or accompanied by a translator) should have been sent to Brazil to track down any evidence of events that might have been related to the Brazil magnesium sample.

The last category of evidence considered is "Indirect Physical Evidence," reviewed by Craig (Condon & Gillmor, 1968, pp. 97–115). In presenting his conclusions, he states:

Of all physical effects claimed to be due to the presence of UFOs, the alleged malfunction of automobile motors is perhaps the most puzzling. The claim is frequently made, sometimes in reports which are impressive because they involve multiple independent witnesses. Witnesses seem certain that the function of their cars was affected by the

unidentified object, which sometimes reportedly was not seen until after the malfunction was noted. No satisfactory explanation for such effects, if indeed they occurred, is apparent. (p. 115)

The discussion of this evidence, both by Condon and by other members of the project staff, is of special interest. It is argued that, if automobile motors are stopped, it must be attributed to magnetic fields associated with UFOs (Condon & Gillmor, 1968, pp. 38, 101, 380). For the one case studied by the project, it was determined that the automobile had not been exposed to a strong magnetic field. Craig (Condon & Gillmor, 1968, p. 380) concludes: "The case, therefore, apparently did not offer probative information regarding UFOs." We shall return to discussion of this argument in Section V.

Scientific Methodology of the Colorado Project

The title of the Condon Report is "Scientific Study of Unidentified Flying Objects." The great weight attached to this report by scientists, by the public, and perhaps by officers of the Federal Government, is based on the presumption that the study was, in fact, scientific.⁵ This has been disputed by a number of individuals, notably McDonald (1969) and Hynek (1972), who make specific criticisms of the methodology of the project. These criticisms will not be repeated here. The following comments are more general in nature.

Whether or not there is a well defined "scientific method" applicable to all scientific problems, the fact is that the practices used by scientists vary from one subject to another. In research areas where the background noise and/or the inherent variability are high, such as epidemiology and meteorology, it is necessary to develop and use appropriate statistical techniques of data analysis. Where the experimental situation is well controlled and where the results are faithfully reproducible, it may suffice and may be desirable to analyze a single experiment in meticulous detail.

It was stressed in Section II that physicists tend to look for an outstanding experiment that, taken in isolation, conclusively proves or disproves some hypothesis. It is perhaps not surprising, therefore, that this is the approach adopted by Condon in appraising the information reported to him by his staff. To some extent, it reflects also the attitude of the scientific staff. For exceptions to this rule, one might cite the recently quoted paragraph by Craig (Condon & Gillmor, 1968, p. 115), concerning "Indirect Physical Evidence," which clearly reflects judgment based on an *accumulation* of evidence. It is also worth pointing out that, if the staff had indeed been searching for one or two cases to prove conclusively one hypothesis or another, it would have been necessary to devote far more time, attention, manpower, and resources to those cases than appears to have been given to any one case.

⁵ And also on the presumption that it was a free and open investigation with no secret aspects such as a hidden agenda or undisclosed involvement with sources of classified information. For further comments on this aspect, see the Postscript.

The UFO problem is perhaps closer to astronomy than physics. No single observation of the position of a single planet establishes Kepler's law. No single observation of the position and magnitude of a single star establishes that the sun is in a disc-shaped galaxy. Nor can data concerning a single star confirm a proposed theory of stellar evolution. In discussing astronomical problems, it is essential to combine evidence derived from many observations. The strength of the observational facts may become significant only when very large numbers of observations are combined.

Following astronomical practice as a guide, one would infer that a crucial first step in the scientific study of UFOs would be the compilation of a catalog. This would have the immediate consequence of drawing upon information already accumulated (in many cases with great effort and great care) by other organizations. For instance, organizations such as APRO (Aerial Phenomena Research Organization), CUFOS (Center for UFO Studies), MUFON (Mutual UFO Network), and NICAP (National Investigation Committee for Aerial Phenomena) have compiled extensive files of UFO cases using careful screening and evaluation techniques. One valuable collection of data, which the project could have used, was that produced by the Battelle Memorial Institute, under contract to the Air Force, and issued as Blue Book Special Report No. 14. This was certainly available to the project, since it was declassified in 1955.

There is, indeed, great advantage to be derived from using more than one source of data. Data derived from one source only might be spurious, or partly spurious, and the same might be true for another source of data. If both sources of data yield distinct and irreconcilable patterns, one would suspect that at least one of the two sources has been subject to biased reduction and possibly even to deliberate fabrication. If one of the sources of data is from one's own scientific staff, one might conclude that the fault lies with the other group, or one might choose to check carefully the methods used by one's own team.

On the other hand, patterns that appear *consistently* in data derived from several sources are far more significant than a pattern that shows up in the data of one source but not in the data of other sources. "Strong" facts of this type can be obtained only by careful cataloging of data from as many responsible sources as one can find. After a catalog has been compiled and patterns supported by the weight of evidence in the catalog have been established, one can then begin the comparison of evidence and hypotheses. (An outstanding example of this process is the construction of the *Hertzsprung-Russell* diagram in astrophysics, which provides the crucial test for any theory of stellar evolution.) This procedure is complex, calling for a careful organization of theoretical work and data reduction. A "bookkeeping" procedure for organizing the many judgments involved in this stage of scientific research has been proposed elsewhere (Sturrock, 1973), with application to astrophysical problems in mind. Some subsequent comments on the scientific study of UFOs are based in part upon this article.

In assessing a phenomenon, it is essential to "filter" the available evidence. A key filtering procedure is represented by the *definition* of the phenomenon. In this respect, Condon's definition, which has already been quoted, suffers from the defect that it allows a great deal of "noise" to accompany whatever "signal" there may be in the data. Most students of the UFO phenomenon would adopt a more restrictive definition such as that adopted by Hynek (1972), who recommends that a "UFO report" be defined as "a statement by a person or persons judged responsible and psychologically normal by commonly accepted standards, describing a personal, visual, or instrumentally-aided perception of an object or light in the sky or on the ground and/or its assumed physical effects, that does not specify any known physical event, object, or process or any psychological event or process." However, the definition of the phenomenon is only one filtering procedure. In discussing a complex phenomenon such as the UFO phenomenon, it should be followed by further "filters" that may comprise restrictions on allowable evidence, classification schemes, etc. The staff summaries, indeed, provide a breakdown of evidence into categories, but this is only a rudimentary scheme of analysis.

Another important point of scientific methodology is that, if one is evaluating a hypothesis (such as ETH), it is beneficial to regard this hypothesis as one member of a complete and mutually exclusive set of hypotheses. This point also seems to have been clearly recognized by Thayer (Condon & Gillmor, 1968, p. 116), but it was apparently ignored by Condon and by other members of the project staff.

Finally, in evaluating a hypothesis, one must avoid procedures of data reduction that depend upon the truth or falseness of that hypothesis. Put another way, one must avoid "theory-dependent" arguments. This requirement, above all, makes the appraisal of the UFO phenomenon very difficult: if we entertain the hypothesis that the phenomenon may be due to an extremely advanced civilization, we must face the possibility that many ideas that we accept as simple truths may, in a wider and more sophisticated context, not be as simple and may not even be truths.

As a specific example, one may draw attention to the argument (Condon & Gillmor, 1968, p. 143) that a supersonic UFO should produce a sonic boom. This is certainly true of every supersonic object that man has constructed. But we should *not* assume that a more advanced civilization could not find some way of traveling at supersonic speeds without producing a sonic boom. Petit (1986) has paid special attention to this aspect of UFO reports and has proposed a procedure involving magnetohydrodynamic processes whereby the shock wave of a supersonic object would be suppressed.

Although it is simple to state this requirement concerning data reduction, it is by no means simple to put it into effect. It may, indeed, be necessary to proceed by trial and error: whenever one runs into an impasse, a situation in which it is impossible to reconcile the established data with any explicitly considered hypothesis (including that of ETH), one may need to review the

process of data reduction to see if the relaxation of an implicit hypothesis will lead to a situation in which the evidence can be reconciled with at least one explicit hypothesis.

A further example of this type of situation is the discussion of "Automobile Malfunction and Headlight Failure" (see Craig in Condon & Gillmor, 1968, pp. 100-108), which was discussed in Section IV. As we have noted, the position taken by Condon and other members of the project staff is that, if automobile motors are stopped, this phenomenon must be due to magnetic fields associated with UFOs. Condon and other members of the staff apparently do not consider the possibility that an advanced civilization may know of and use physical processes with which we are now unfamiliar. [Yet this possibility is perhaps the most intriguing reason a scientist would be interested in studying the UFO phenomenon.] The discussion of sonic booms and of automobile engine malfunction by the Condon staff provide two prime examples of theory-dependent arguments.

Discussion

The evaluation of evidence by category, presented in Section IV, seems to show that each staff summary is a fair and justifiably cautious summary of the relevant case material. By contrast, Condon's summary bears little relation to the work, analyses, and summaries of his own staff. Hence, a minimal criticism that one might make is that the efforts of many individuals found no satisfactory integration.⁶

This failing may have been due in part to a faulty initial conception of the nature of the phenomenon. If, as the Director may have believed, the phenomenon could be tackled as a straightforward problem of physical science, there might now be little disagreement among the scientific community regarding the validity and conclusions of the Report. The UFO phenomenon appears instead to be more akin to some of the enigmatic phenomena of modern astronomy, such as the sources of gamma-ray bursts. Concerning these strange objects, we do not know where they are, we do not know what they are, and we can only speculate on how they function; but these limitations, severe as they are, by no means deter astronomers and astrophysicists from studying them as intensively as possible.

Concerning UFOs, we are not sure whether they are hoaxes, illusions, or real. If real, we do not know whether the reality is of a psychological and sociological nature, or one that belongs in the realm of physics. If the phenomenon has physical reality, we do not know whether it can be understood in terms of present-day physics, or whether it may present us with an example

⁶ When I showed an early version of this analysis to one of the Principal Investigators of the Colorado Project, he remarked, "You should have seen the first draft that Condon wrote. It was much worse. After I pointed out a lot that was wrong with the first draft, Condon rewrote it and improved it considerably."

of 21st century (or 30th century) physics in action. If one is, indeed, facing a problem of this magnitude, it is necessary to devote the utmost care to the scientific methodology involved in the project.

In sum, it is my opinion that weaknesses of the Condon Report are an understandable but regrettable consequence of a misapprehension concerning the nature and subtlety of the phenomenon. It is also my opinion that there is much in the Condon Report that could be used in support of the proposition that an analysis of the totality of UFO reports would show that a signal emerges from the noise and that the signal is not readily comprehensible in terms of phenomena now well known to science. If this is so, then the Report makes a case for the further scientific study of UFO reports. It appears that this opinion is, in fact, shared by certain members of the Colorado Project staff. For instance, Professor David R. Saunders, who left the project in unfortunate circumstances, has published a book (Saunders & Hawkins 1968) challenging the findings of the Condon Report. Gordon D. Thayer also has continued his interest in the phenomenon, as is evident from his report on the Lakenheath case for the journal *Astronautics and Aeronautics* (Thayer, 1971).

In conclusion, it is necessary to comment briefly on the review of the Condon Report by the National Academy of Sciences Panel (Condon & Gillmor, 1968, pp. vii-ix). This distinguished body reviewed the report and fully endorsed its scope, methodology, and findings. In Section IV, we have noted the discrepancies between facts and views advanced by the Colorado Project staff and those advanced by the Director. In comparing these with the NAS Panel Review, it is clear that some of their information is taken from the Director's "Summary of the Study," even where the content of this section is contradicted by material presented in Sections CR III and CR IV of the report. For instance, in discussing photographic cases, the Panel asserts that "35 photographic cases were investigated . . . none proved to be real objects with high strangeness." This statement is entirely compatible with Condon's discussion of photographic evidence in Section CR II of the report; but, as we have seen in Section III, Condon's statements are not compatible with material presented by Hartmann, who carried out the photographic analysis: Hartmann discussed 14 cases, not 35; and, in his summary (CR 86), Hartmann states, ". . . after investigation, there remains a small residual of the order of 2% of all cases, that appears to represent well recorded but unidentified or unidentifiable objects that are air-borne—i.e. UFOs. . . ."

The Condon Report has also been studied by the UFO Subcommittee of the American Institute of Aeronautics and Astronautics, as part of their appraisal of the UFO problem (Kuettner et al., 1970). The Subcommittee states that "not all conclusions contained in the Report itself are fully reflected in Condon's summary." The subcommittee also points out that "Condon's chapter, 'Summary of the Study,' contains more than its title indicates; it discloses many of his personal conclusions."

Condon's most important recommendation was perhaps that concerned with future activity. He states that "further extensive study of UFOs probably

cannot be justified in the expectation that science will be advanced thereby" (Condon & Gillmor, 1968, p. 1). The NAS panel concurred in this recommendation. On the other hand, the AIAA UFO Subcommittee "did not find a basis in the report for his prediction that nothing of scientific value will come of further studies."

The NAS panel, which was appointed in late October and early November 1968, began their initial reading of the report on November 15, 1968. The panel convened on December 2 and again on January 6, 1969, to conclude its deliberations and to prepare its findings. Seven weeks is a very short time for the panel members to digest a report on what was probably an unfamiliar subject.⁷ This is especially true when there are gross discrepancies between the report and its summary, which readers are unlikely to expect. By contrast, the views of the AIAA Subcommittee were crystallized late in 1970, allowing more time to appreciate the subtleties of the problem and to digest the massive report.

This re-examination of the Condon Report and my comparatively brief quotations from the reviews by the NAS panel and the AIAA subcommittee may cast doubt on some of the findings of the report and some of the opinions and recommendations of the Director. The following quotation shows that such dissent was foreseen, and even encouraged, by Condon himself:

Scientists are no respecters of authority. Our conclusion that study of UFO reports is not likely to advance science will not be uncritically accepted by them. Nor should it be, nor do we wish it to be. For scientists, it is our hope that the detailed analytical presentation of what we were able to do, and what we were unable to do, will assist them in deciding whether or not they agree with our conclusions. Our hope is that the details of this report will help other scientists in seeing what the problems are and the difficulties of coping with them. (Condon & Gillmor, 1968, p. 2)

Postscript

The first draft of this article was prepared in 1974, but has recently been extensively rewritten. In the intervening years, new information has come to my attention that raises serious questions about the Colorado Project.

In the Introduction, I pointed out that the importance of the Condon Report is due to the fact that the study "is the only unclassified investigation of the UFO phenomenon carried out by an established scientific organization under contract to a U.S. federal agency." By contrast, documents that were originally classified and have since been released (such as reports arising from Projects Sign, Grudge, and Blue Book) make almost no impact on the scientific community. The reason for this may be understood from a remark of Condon

⁷ I have learned from private conversation with one of the panelists that, in fact, all of the panelists were not as happy with the Condon Report as the panel report would indicate. He told me that he had had concerns and reservations about the Condon Report but did not press them in the panel discussions because he "did not want to rock the boat."

himself, who writes: "Where secrecy is known to exist, one can never be absolutely sure that he knows the complete truth" (Condon & Gillmor, 1968, p. 522).

This remark of Condon's was made in relation to the proposition that "some agency of the Government—either within the Air Force, the Central Intelligence Agency, or elsewhere—knows all about UFOs and is keeping the knowledge secret. . . . We decided not to pay special attention to [this hypothesis], but instead to keep alert to any indications that might lead to any evidence that not all of the essential facts known to the government were being given to us. . . . We found no such evidence."

The above statement, that the Colorado Project found no evidence that the government might be withholding information about the UFO problem, should be compared with the account of Case 30 (Condon & Gillmor, 1968, pp. 341,342). The abstract of this case reads: "A civilian employee at an AFB confirmed an earlier report that base personnel had made an UFO sighting, although official sources denied that such an event had occurred." The background reads: "A rumor was relayed to this project by a source considered to be reliable, reporting in the fall, 1967, six UFOs had followed an X-15 flight at the AFB. It was suggested that motion pictures of the event should be available from the Air Force." There follows an account of the investigation that includes the following remarks: "The rumor persisted, however, with indications that official secrecy was associated with the event. If reports of the event had been classified, no record would appear on the operations log. . . . A responsible base employee . . . had reassured our source that there was a sighting by pilots and control tower operators. . . . His replacement . . . is quoted as saying that there apparently was something to it because 'they are not just flatly denying it.' " Attempts to learn more about the reported event from the PIO [Public Information Officer] were met with apparent evasion from that office. [The PIO was never available for telephone conversation and never returned telephone calls, even when a Pentagon officer transmitted a request to the base Director of Information that he telephone the Project Investigator and clarify this situation.] "(The source) was contacted later . . . and asked for clarification of the incident. He responded only that the Director of Information had told him to 'stay out of that.' " The conclusion of this case reads as follows: "Although it is true that the report of this incident was never more than a rumor, it is also true that project investigators were not able to satisfactorily confirm or deny that an UFO incident had occurred. Attempts to investigate the rumor were met with evasion and uncooperative responses to our inquiries by base information."

If Condon was familiar with the details of this case, as he certainly should have been, it is hard to understand that he would state without qualification or comment that "We were assured that the federal government would withhold no information on the subject. . . ." (Condon & Gillmor, 1968, p. 8).

In the late 1970s, the Freedom of Information Act made it possible to request from federal agencies information that had been classified. On learning

that the Central Intelligence Agency had released some information related to the UFO problem, I requested copies of this information from the CIA and received it in 1979. Some of the documents refer to the Colorado Project. On February 7, 1967, a memorandum for the Deputy Director for Intelligence reports on the U.S. Air Force contract with the University of Colorado to investigate the UFO situation. It reported arrangements between Brigadier General Ed Giller (USAF) and Dr. Thomas Ratchford (AFOSR) with Arthur C. Lundahl (Director of the National Photographic Interpretation Center [NPIC] of the CIA), which provided for NPIC to provide photographic services to the Air Force in support of the Colorado Project. Arrangements were made for Condon, Low, Saunders, William Price (ex-director of AFRST), and John Coleman (listed as "ex-director of the National Academy of Sciences") to visit NPIC. All five visitors were cleared for at least USAF secret. Lundahl had told the USAF representatives that he could "have no part in writing whatever they might conclude on this UFO phenomena [*sic*]." ⁸ Lundahl goes on to say, "I might be able to preserve a CIA window on this program for whatever use DRS&T might want to make of it."

A memorandum for the record, dated February 23, 1967, concerns the planned visit to NPIC, which occurred on February 20, 1967. Dr. Condon was accompanied by "Dr. Richard Lowe [this must refer to Mr. Robert Low], Dr. David Saunders, Dr. William Price, and Dr. Thomas Ratchford. The clearance level was secret. It was agreed that NPIC would assist Dr. Condon on the understanding that this assistance would not be identified as work accomplished by the CIA. NPIC presented briefings on their analytical capabilities and on their results "on the second UFO project." There followed "a general discussion on UFOs."

A document dated March 24, 1967, is entitled "Guidance to UFO Photographers" and comprises a list of ten recommendations to photographers who have an opportunity to photograph a UFO event, and an information sheet that the photographer should complete. This document was prepared by NPIC and approved by Dr. Arthur C. Lundahl, Director of NPIC. On May 1, 1967, the Colorado Project issued a press release calling for "pictures of unidentified flying objects from private citizens," and it gave a set of recommendations to the photographer and a list of items of information that the photographer should prepare. This press release is simply a rewrite of the NPIC document.

A "memorandum for the record," dated May 8, 1967, concerns a "UFO briefing for Dr. Edward Condon, 5 May 1967." Those listed as being in at-

* We must hope that Lundahl had no firm basis for his assumption that the conclusions of the study were to be written by Air Force staff rather than by the Director of the study. On the other hand, when we find phrasing such as "Paralleling the official government interest, was a burgeoning of amateur interest . . ." (Condon & Gillmor, 1968, p. 13) in a section ostensibly written by Condon, a master of scientific prose, and when we contrast Condon's detailed and apparently accurate history of Air Force involvement (pp. 502-552) with his sparse and inaccurate account of the work of his own team (pp. 7-50), it seems highly likely that he had received some help from official quarters.

tendance were (in addition to CIA staff) Condon, Low, Hartmann, Ratchford, Dr. Charles Reed of the National Research Council, and someone whose name is suppressed in the released document. This unknown person presented a briefing on photogrammetric analysis he had carried out on a UFO case, and his briefing impressed Condon and his group very favorably. At that meeting, preliminary arrangements were made for contractual arrangements which would enable the unknown person to carry out analysis for the Colorado Project. It was agreed that that unknown person would submit his report on the analysis of the Zanesville photography through certain channels so that it would reach Condon. It is clear that the unknown person must have been Dr. Everitt Merritt of the Autometrics Division of the Raytheon Company of Alexandria, Virginia. As the reader will remember, Condon referred extensively to the work of Merritt when dealing with photographic evidence, including Merritt's analysis of the Zanesville case. Hence, the CIA releases explain how Condon "became acquainted with Everitt Merritt" and why and how he "made arrangements with Merritt for his services." During the May 5, 1967, meeting, Condon "indicated he wished to keep a channel open into our organization [CIA/NPIC]." It was agreed that Dr. Merritt's report on his analysis of the Zanesville photography would be forwarded, for distribution to Dr. Condon, through an office, the name of which has been deleted from the document.

The facts that Condon and some members of his staff had secret meetings with some members of the Central Intelligence Agency, that the CIA contributed to the work of the Colorado Project, and that these facts are not revealed in the Condon Report, raise troubling questions. If Condon and some members of his staff received secret briefings from the CIA, did they also receive secret briefings from the Air Force and perhaps from other agencies? If they did receive secret briefings from the Air Force, can one accept at face value Condon's statement (Condon & Gillmor, 1968, p. 8) that "The contract provided that the planning, direction and conclusions of the Colorado project were to be conducted wholly independently of the Air Force"? If there were no secret briefings, why was it necessary to arrange Air Force secret clearance for some members of the Project staff? Was there a "hidden agenda" for the Colorado Project? Would knowledge of the hidden agenda, if it existed, help one to understand the gross mismatch between Condon's summary and the work of his own staff? Why did Condon attach so much more weight to the work of Merritt, whom he met through the good offices of the CIA, than he did to the work of Hartmann, who was a member of the staff of the Colorado Project? Finally, given the importance attached by the scientific community to the subsequent review of the Condon Report by a panel of the National Academy of Sciences, what is one to make of the presence at a meeting early in the project between Condon and his staff and CIA staff, of a scientist identified in the CIA record as "ex-director of the National Academy of Sciences"?

It is conceivable that these concerns are groundless, that there were no secret meetings other than those already referred to, and that these had no

impact whatever on the policy guiding the conduct of the Colorado Project. It may be that the discrepancy between Condon's summary and the work of his own staff was the result of an innocent lack of activity and lack of perception on Condon's part. Nevertheless, to repeat an earlier quotation from Condon, "where secrecy is known to exist, one can never be absolutely sure that he knows the complete truth" (Condon & Gillmor, 1968, p. 522).

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