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EX PARTE OR LATE FILED

December 5, 2000

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

Magalie Roman Salas
Secretary
Federal Communications Commission
445 12th Street, S.W.
TW-B204
Washington, D.C. 20554

EX PARTE OR LATE FILED

Re: Applications of America Online, Inc. and Time Warner, Inc. for Transfer of Control (CS Docket No. 00-30)
Notice of Ex Parte Presentation

Dear Ms. Salas:

The purpose of this letter is two-fold. First, I would like to put into writing my views as to the overall framework that the Commission should use in evaluating the impact of the AOL-Time Warner merger on instant messaging ("IM") competition. In any merger involving a dynamic industry, it is extremely difficult to get good information regarding market shares and other relevant data that would allow one to predict the effects of that merger with a high degree of confidence. Accordingly, I believe it is important to step back and ask: What are the costs of being wrong in this context? If, in fact, the merger irreversibly tips the market in favor of AOL, but the Commission approves it without conditions, then the merger would threaten the development of a host of innovative applications. These innovations will not only be created for personal computers but for next-generation wireless devices and interactive TV as well. On the other hand, if the merger would not have any impact on IM competition, but the Commission nevertheless imposed interoperability conditions, then all that the Commission has done is to foster interoperability under which AOL would exchange traffic on same terms and on the same schedule as every other IM provider (which AOL claims it will do anyway in the near future).

This asymmetry counsels strongly in favor of imposing IM interoperability conditions. I have attached hereto at Tab 1 academic literature supporting this economic framework for decision making. Professor Steven Salop, who I understand has appeared on behalf of AOL in this proceeding, has been at the forefront in recognizing that agencies should expressly account for this type of informational uncertainty in their decision making. His article, *Decision Theory and Antitrust Rules* is among those attached at Tab 1.[1] Also included in Tab 1 are materials discussing the impact

[1] I feel compelled to note that his co-author is counsel to AT&T Corp. in this proceeding.

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that the Federal Trade Commission's failure to act in similar circumstances had on competition for operating systems for the IBM personal computer.

The second purpose of this letter is to respond to requests made by several members of the Commission Staff during my November 21, 2000 presentation to provide academic literature relevant to the issues I was discussing. I have attached to this letter articles and materials responding to those requests. Tab 2 contains materials responding to the question of whether it is necessary to allow a first mover to fully capture, and exclude others from, the network effects generated by a new product in order to provide sufficient incentives for innovation. These articles demonstrate that a new product which experiences network externalities need not be monopolized to generate enough profits to cover the research and development costs. Tab 3 contains materials that describe the incentives for a firm to vertically integrate when one or more stages of production are characterized by high average fixed costs and low marginal costs, and the substantial competitive issues that such vertical integration can create when the vertically-integrated firm has market power or even a large market share.

Sincerely,

Frederick Warren-Boulton

Frederick R. Warren-Boulton

cc: Magalie Roman Salas
Commissioner Michael Powell
Kyle Dixon
Susan Eid
Kathy Brown
Karen Onyeije
David Goodfriend
Helgi Walker
Jay Friedman
Deborah Lathen
Gerald Faulhaber
Robert Pepper
John Berresford
Sherille Ismail
Peter Friedman
To-Quyen Truong
Royce Dickens
Darryl Cooper
Linda Senecal
Jim Bird
Joel Rabinovitz
International Transcript Services, Inc.

INTRODUCTORY STATISTICS FOR BUSINESS AND ECONOMICS

FOURTH EDITION

Thomas H. Wonnacott
University of Western Ontario
Ronald J. Wonnacott
University of Western Ontario

WILEY
JOHN WILEY & SONS
New York Chichester Brisbane Toronto Singapore

Applied statisticians increasingly prefer p-values to classical testing, because classical tests involve setting α arbitrarily (usually at 5%). Rather than introduce such an arbitrary element, it is often preferable just to quote the p-value, leaving readers to pass their own judgment on H_0. [By determining first their own level of α, readers may then reach their own decision using (9-27).]

C—TYPE I AND TYPE II ERRORS

In the decision-making process we run the risk of committing two distinct kinds of error. The first is shown in panel (a) of Figure 9-6 (a reproduction of Figure 9-4), which shows what the world looks like if H_0 is true. In this event, there is a 5% chance that we will observe $\overline{X}$ in the shaded region, and thus erroneously reject the true H_0. Rejecting H_0 when it is true is called a *type I error*, with its probability of course being α, the error level of the test. (Now we see that when we use the term "error level of a test" we could say more precisely, "the type I error level of a test.")

But suppose the claim of the engineering department is true, and the mean lifetime μ is indeed greater than 1200. This is customarily called the *alternative hypothesis* H_A: $\mu > 1200$. This is a real possibility, and we had

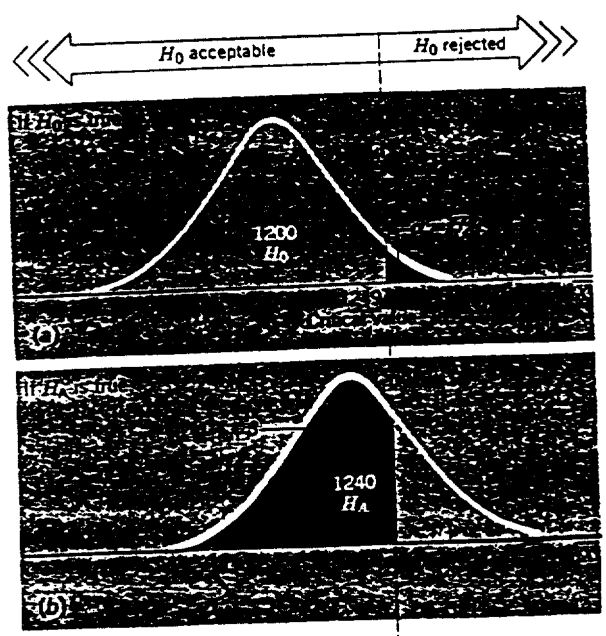

FIGURE 9-6
The two kinds of error that can occur in a classical test. (a) If H_0 is true, then α = probability of erring (by rejecting the true hypothesis H_0). (b) If H_A is true, then β = probability of erring (by judging that the false hypothesis H_0 is acceptable).

TABLE 9-1 Four Possible Results of an Hypothesis Test (Based on Figure 9-6)

State of the World	*Decision*	
	H_0 Acceptable	*H_0 Rejected*
If H_0 is true	Correct decision. Probability $= 1 - \alpha$ = confidence level	Type I error. Probability $= \alpha$ = level of the test
If H_0 is false (H_A true)	Type II error. Probability $= \beta$	Correct decision. Probability $= 1 - \beta$ = power of the test

better investigate it as thoroughly as we did the null hypothesis. To be specific, suppose $\mu = 1240$, so that $\overline{X}$ fluctuates around 1240, as shown in panel (*b*). The correct decision in this case would be to reject the false null hypothesis H_0. An error would occur if $\overline{X}$ were to fall in the H_0 acceptance region. Such acceptance of H_0 when it is false is called a *type II error*. Its probability is called β, and is shown as the shaded area in panel (*b*).

Table 9-1 summarizes the dilemma of hypothesis testing: The state of the real world is unknown. We don't know whether H_0 is true or false. If a decision to reject or not reject must be made[8] in the face of this uncertainty, we have to take the risk of one error or another.

A legal analogy may help. In a murder trial, the jury is being asked to decide between H_0, the hypothesis that the accused is innocent, and the alternative H_A, that he is guilty. A type I error is committed if an innocent man is condemned, while a type II error occurs if a guilty man is set free. The judge's admonition to the jury that "guilt must be proved beyond a reasonable doubt" just means that α should be kept very small.

PROBLEMS

9-7 Consider the problem facing an air traffic controller at Chicago's O'Hare Airport. If a small irregular dot appears on the screen, approaching the flight path of a large jet, she must decide between:

H_0: All is well. It's only a bit of interference on the screen.
H_A: A collision with a small private plane is imminent.

[8] Of course, other more complicated decision rules may be used. For example, the statistician may decide to suspend judgment if the observed $\overline{X}$ is in the region around 1250 (say $1240 < \overline{X} < 1260$). If he observes an ambiguous $\overline{X}$ in this range, he then would undertake a second stage of sampling—which might yield a clear-cut decision, or might lead to further stages (i.e., "sequential sampling").

Elementary Statistics

SECOND EDITION

Gene R. Sellers
Sacramento City College

Stephen B. Vardeman
Iowa State University

SAUNDERS COLLEGE PUBLISHING
Philadelphia New York Chicago
San Francisco Montreal Toronto
London Sydney Tokyo Mexico City
Rio de Janeiro Madrid

24. If μ is the average number of chocolate chips in a Chips Ahoy cookie by Nabisco, then for

$$H_0: \mu = 16$$
$$H_a: \mu \neq 16$$

find the values of $\bar{x}_c$ for $n = 36$, $\sigma = 3.0$, and a 10% level of significance.

6–2 TYPE I AND TYPE II ERRORS

Whenever a null hypothesis is tested, one of two decisions is reached:

Reject H_0

or

Do Not Reject H_0

Whichever decision is reached, the possibility exists that an error has been made. The two possible types of error are:

1. H_0 is rejected and H_0 is true
2. H_0 is not rejected and H_0 is false

News Item 6–3 is used to illustrate the two possible errors with a specific example.

NEWS ITEM 6–3 *The Lafayette Journal and Courier*, December 15, 1980.

Nearly 50 percent of seventh graders and 88 percent of 12th graders know where to find marijuana, says the Indiana School Drug Study, conducted by Herb Jones and Dale Hahn of Ball State University. Sixty-three percent of 12th graders say they have smoked pot.

Suppose the Indiana Parent Teacher Association feels that the 88% figure is too high and is willing to select and interview a random sample of 100 Indiana high school seniors in an attempt to prove their point. For testing the hypothesis

$$H_0: \pi = 0.88$$

with alternative hypothesis

$$H_a: \pi < 0.88$$

and a 5% level of significance, the critical value the PTA would use is

$$p_c^* = 0.88 - 1.65\sqrt{\frac{(0.88)(0.12)}{100}}$$
$$= 0.88 - 0.05$$
$$= 0.83$$

The approximate sampling distribution of p^* if H_0 is true, and the PTA's decision regions are indicated in Figure 6–8. If the PTA obtains a sample with p^* that is less than 0.83, it will reject H_0 in favor of H_a. If p^* is at least 0.83, it will not be able to reject H_0.

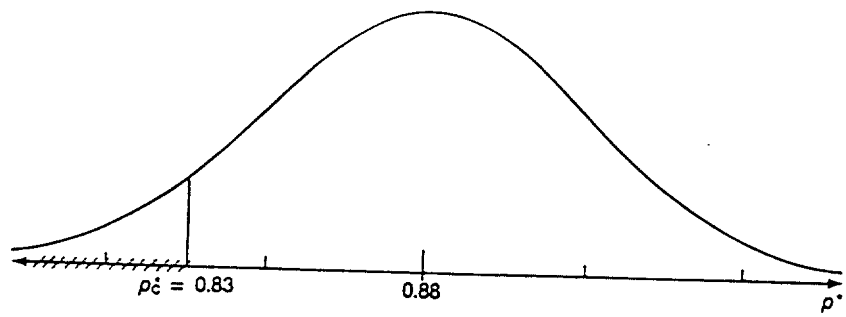

FIGURE 6–8 Sampling distribution of p^* and decision regions.

Four possible results of the PTA's investigation are illustrated in Figure 6–9. As this figure illustrates, it is common practice to distinguish between

	π is 0.88 or more	π is less than 0.88
p^* is less than 0.83	so called Type I Error	Correct Decision
p^* is 0.83 or more	Correct Decision	so called Type II Error

FIGURE 6–9

the two possible types of error in a hypothesis-testing problem via the names "type I error" and "type II error." Notice that the possibility labeled as a type I error occurs when the state of affairs symbolized by the null hypothesis holds but the decision is made to reject the null hypothesis in favor of the alternative hypothesis. The possibility labeled as a type II error occurs when the state of affairs corresponding to the alternative hypothesis holds but the null hypothesis is not rejected. A table similar to that in Figure 6–9 but applicable to any hypothesis-testing problem is in Figure 6–10.

		The actual value(s) of the parameters(s) is(are):	
		described by H_o	described by H_a
The Decision is made to:	reject H_o	Type I Error	Correct Decision
	not reject H_o	Correct Decision	Type II Error

FIGURE 6–10

It is standard practice to guard against type I errors in a hypothesis-testing situation by choosing critical values in such a way that the chance of rejecting H_0 when H_0 is true is small. The probability of rejecting H_0, calculated supposing the stated value of the parameter holds, is symbolized as α and often termed "the type I error probability."

■ *Whoa! How am I supposed to find one of these α's in a given problem?*

■ You've already done it several times: "α," "the type I error probability," and "the significance level" are different names for the same quantity. A test conducted at the .05 level of significance has $\alpha = 0.05$. That is, if the null hypothesis is true there is only a 5% chance of (incorrectly) rejecting H_0.

EXAMPLE 1 The president of a large corporation would like to announce that this year the charitable pledges to the community chest have a larger mean than last year's \$10. All pledge cards have been returned but not tabulated. He instructs an aid to bring him a random sample of 36 pledges, intending to announce an increase if the sample mean pledge exceeds \$10. If in fact the population of pledges has a standard deviation of \$3, find the α that the president is using.

Solution For testing

$$H_0: \mu = 10$$
$$H_a: \mu > 10$$

with $n = 36$, the approximate sampling distribution of $\bar{x}$ is normal with

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{3}{\sqrt{36}} = 0.5$$

The sampling distribution of $\bar{x}$, of the president's decision regions and α are shown in Figure 6–11. The shaded area under the curve is α (the level of significance).

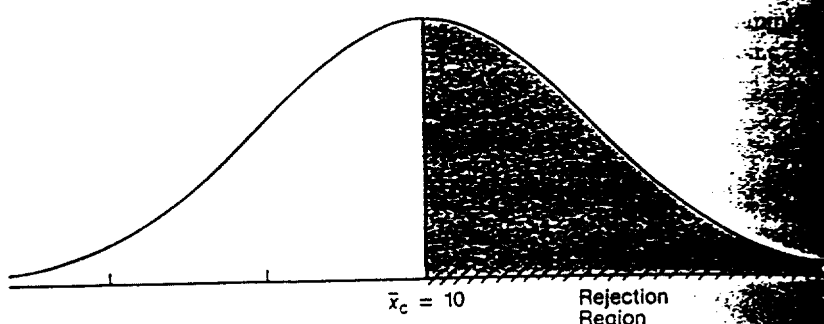

FIGURE 6–11 Sampling distribution of $\bar{x}$ with $\mu = 10$ and $\sigma_{\bar{x}} = 0.5$.

With $\bar{x}_c = 10$, $\mu_0 = 10$ and $\sigma_{\bar{x}} = 0.5$

$$z_c = \frac{10 - 10}{0.5} = 0$$

so

$$P\text{ (type I error)} = P(\bar{x} > 10) = P(Z > 0) = 0.5000$$