The Life and Legacy of Bui Tuong Phong

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ABSTRACT

We examine the life and legacy of pioneering Vietnamese American computer scientist Bùi Tường Phong, whose shading and lighting models turned 50 last year. We trace the trajectory of his life through Vietnam, France, and the United States, and its intersections with global conflicts. Crucially, we present evidence that his name has been cited incorrectly over the last five decades. His family name appears to be Bùi, not Phong. By presenting these facts at SIGGRAPH, we hope to collect more information about his life, and ensure that his name is remembered correctly in the future.

ACM Reference Format:

1 BIOGRAPHY

The Phong shading and lighting models [1973] turned 50 last year, and are ubiquitous in computer graphics. They are the most basic shaders in OpenGL and WebGL (see left), and run on browsers, video game consoles, and smartphones throughout the world. Despite this, very little is known about the life of their creator, Bùi Tường Phong.

We have only been able to locate one photo of his full face (see right), which we have authenticated through personal communications with his colleagues Jim Clark and Ed Catmull. Image searches for his name consistently and erroneously return images of the Vietnamese writer Chu Cẩm Phong.

The most comprehensive information we have found is the article of Nguyen [2007]. In order to fill in the gaps and form a fuller picture of Bùi Tường Phong’s life, we will outline the facts discovered by Nguyen here, then situate them within global events.

Nguyen [2007] reports that Bùi Tường Phong was born in Hanoi in 1942. This was a turbulent time in Vietnam, as it was still a French colony (French Indochina), but the German invasion of France had left it vulnerable to Japanese occupation, and later on, indigenous uprising. [Kiernan 2019]

Nguyen reports that Bùi Tường Phong moved from Hanoi to Saigon in 1954. This coincides with the Geneva Conference, originally intended to broker the end of the Korean War, which partitioned the country into North and South Vietnam along the 17th parallel. Over a million refugees fled from the Communist north (Hanoi) to the French south (Saigon) [UNHCR 2000].

Nguyen reports that Bùi Tường Phong immigrated to France in 1964 and obtained several degrees before joining IRIA, present-day INRIA. The year of his immigration coincides with the Gulf of Tonkin incident, which dramatically escalated U.S. involvement in the Vietnam War, and initiated large-scale bombing of North Vietnam ([Kiernan 2019] p. 432).

Nguyen reports that Bùi Tường Phong immigrated to the U.S. in 1971, and obtained a Ph.D. from the University of Utah in 1973. He died of leukemia in 1975, shortly after beginning a faculty position at Stanford. In examining this final component, we must integrate some difficult facts from across his lifetime.

He lived in Saigon, present-day Ho Chi Minh City, from 1954 to 1964. This period overlapped with Operation Ranch Hand (1962-71), during which the U.S. military sprayed 20 million gallons of herbicide over Vietnam, Cambodia, and Laos. These rainbow herbicides, the most notable of which is Agent Orange, contain carcinogenic dioxins that are known to cause leukemia, the same illness that Bùi Tường Phong died of.

A variety of sites around Saigon are known to be spray sites or staging areas for Ranch Hand (Fig. 1). Two spray sites in 1962 were the U.S. air base at Bien Hoa and the Than Tuy Ha ammunition dump (Buckingham [1982], p. 35). The Agent Orange contamination at Bien Hoa is still being cleaned up today [Stewart 2018]. The Tan Son Nhut air base also served as a staging area and herbicide storage facility starting in 1962 (Young [2009] p. 62).

Together, these sites form a triangle around the Lycée Jean Jacques Rousseau, the school that, according to Nguyen, Bùi Tường Phong attended before moving to France in 1964. There is a high probability that he was exposed to the rainbow herbicides, though we will never know how much it contributed to his illness. For comparison, any U.S. veteran who served in the Republic of Vietnam anytime between 1962 and 1975 and later developed leukemia qualifies for Veterans Administration [2023] compensation.

While the tides of war flowed through Bùi Tường Phong’s life, we are most interested in properly honoring his scientific achievements. Thus, we next turn to his legacy.
2 CITATION CONFUSION

Bùi Tường Phong’s death at an early age has created significant confusion around his name, particularly his given (first) name, and family (last) name. This sort of confusion was common with Vietnamese and other Asian names in the 1970s, because the Western convention is inverted, with the family name coming before the given name. The confusion appears to have carried over into the most basic component of his scientific legacy: his citations.

2.1 The First Decade of Citations

One of the earliest appearances of the term Phong shading is Ed Catmull’s dissertation [1974], where the bibliography lists Bui-Tuong Phong as its inventor. The hyphen suggests that Tuong-Phong is his “compound” given name [Phan 1985], while Bui is his family name. The same hyphenation scheme is repeated in Fred Parke’s dissertation [1974] that same year.

A year after his passing, the influential paper of Blinn and Newell [1976] shifted the hyphen to the first two syllables, Bui-Tuong Phong, further delineating Phong as the family name. The highly cited textbook by Foley and Van Dam [1982] further inverted the name, and described the shading model developed by Phong Bui-Tuong (p. 577). The authors listed Bui-Tuong as his family name, and the citation became [BUIT75] Bui-Tuong Phong (p. 628).

In the first decade after Bùi Tường Phong’s passing, citations variously listed his family name as Bui, Phong, and Bui-Tuong. His CACM article [1975], cited over 5000 times as of this writing, offers no additional guidance. He listed his own name without any hyphens: Bui Tuong Phong. Today, in the ACM Digital Library, his citations appear under the name Phong, Bui Tuong.

2.2 Bui Appears to be Correct

Several pieces of evidence suggest that Bùi Tường Phong’s family name is in fact Bui, or more precisely, Bùi. First, Bùi is an extremely common family name in Vietnam, e.g. like Smith or Miller in the U.S. To draw a Western analogy, while it is certainly possible that John Smith refers to a person named Smith whose last name is John, it is highly unlikely.

Second, we have found two instances where Bùi Tường Phong explicitly delineated his given name from his family name. The title page of his dissertation [1973] lists his name in un-hyphenated form as Bùi Tường Phong. However, the cover of the dissertation hyphenates his name as Bùi Tường-Phong. This is consistent with the convention used by his classmates [Catmull 1974; Parke 1974].

We take this hyphenation to be canonical, as it seems likely that Bùi Tường Phong proofread the cover of his own dissertation.

Most importantly, he cites himself in his final publication [Bui and Crow 1975]. The paper appeared in a U.S.-Japan conference whose proceedings are not widely available; our university librarian had to track down a copy. He cites himself as Bui, Tuong-Phong. The comma directly indicates that his family name is Bui. The most basic way to honor Bùi’s legacy is to cite his works in the way that he himself wanted them to be cited; with the family name Bùi and the given name Tuong-Phong.

The citation should be: Bui, Tuong-Phong. The Western ordering, in the style of John Smith, should be: Tuong-Phong Bui.

2.3 Phong Shading Appears to be Correct

The preceding also implies Prof. Bùi’s shading model has been named incorrectly; i.e. it should be the Bui model, not the Phong model. However, if we continue to adopt the naming conventions that Prof. Bùi himself used, this does not appear to be the case.

In Figure 4.12 of his dissertation [1973], he directly refers to his shading model as Phong Improved Shading. The abstract of his 1975 paper additionally refers to Phong and Gouraud shading.

We have not been able to determine whether he himself started calling it the Phong model, or whether the eponym originated from one of his colleagues, and he then went along with it. Given how eponyms are usually coined, the latter seems more likely. Our hope is that a SIGGRAPH attendee might have first-hand knowledge of this, because our exchanges with early researchers (Gouraud, Catmull, Clark, Sutherland) have not yielded anything definitive.

Regardless, Prof. Bùi did not contest the naming. His personal reasons will likely remain unknown, but one possibility is that he saw its poetry: phong translates to (of the) wind.

REFERENCES


AL Young. 2009. The history, use, disposition and environmental fate of Agent Orange. Springer.

Figure 1: Triangle of Ranch Hand sites, outside of Saigon in 1962. Clockwise from left: Tan Son Nhat and Bien Hoa air bases, and Than Tuy Ha ammunition dump (estimated from Buckingham [1982]). The red circle is Lycée Jean Jacques Rousseau, Prof. Bùi’s school.